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PART 1.

TRANSACTIONS
OF THE
SOCIETY FOR BRITISH
ENTOMOLOGY

EDITOR:

**F. J. KILLINGTON, B.Sc., A.L.S., F.R.E.S.,
F.S.B.E.**

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B. M. HOBBY, M.A., D.PHIL., F.R.E.S.

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EDWARDS, F. W., Sc.D., F.R.E.S.: British Short-palped
Craneflies. Taxonomy of Adults.

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PART I.

BRITISH SHORT-PALPED CRANEFLIES. TAXONOMY OF ADULTS.

By F. W. EDWARDS, Sc.D., F.R.E.S.

The craneflies or daddy-long-legs form one of the main groups of Nematocerous Diptera, and though they are familiar to every entomologist and include some of the most conspicuous of all British flies, their study has until recently been much neglected. The larger species comprising the subfamily Tipulinae having been dealt with by Mr. H. Audcent (1932, *Trans. Ent. Soc. S. Engl.*, 8: 1-34), the time is opportune for completing an account of the British species by a revision of the smaller forms. Osten-Sacken, the first serious student of the craneflies, to whom we owe the main outlines of our modern classification, divided them into two main sections, the *Tipulidae longipalpi* and the *Tipulidae brevipalpi*. The first of these sections corresponds with our subfamily Tipulinae; the second included the Limnobiinae and Cylindrotominae, which have sometimes been (but are not now) regarded as forming distinct families, and also the small group of winter-gnats, which have only recently been separated from the Tipulidae and shown to possess many features allying them with the Anisopodidae (Rhyphidae). The present revision is concerned with the whole of Osten-Sacken's *Tipulidae brevipalpi*, and to avoid any ambiguity in the employment of a family name I have translated this term and referred to the insects collectively as 'short-palped craneflies.'

The craneflies as a whole are readily distinguished from all other groups of Nematocerous Diptera in Britain by the fact that the two anal veins of the wing are both distinct and run to the margin. The four groups of craneflies are defined in the introductory remarks to each section in this revision, but the following key may also be of use in distinguishing them and the other families of British Nematocera (compare Fig. 1 for explanation of symbols for wing-veins).

KEY TO FAMILIES OF BRITISH NEMATOCEROUS DIPTERA.

(Excluding wingless forms.)

1. Two distinct and complete anal veins; mesonotum with a V-shaped furrow dividing praescutum from scutum 2.
At most one distinct and complete anal vein; mesonotal V-shaped furrow absent (except in Ptychopteridae, in which its shape is different) .. 5.
2. Ocelli absent; vein *2a* moderately long (TIPULIDAE) 3.
Ocelli present; vein *2a* very short TRICHO CERIDAE (p. 151).
3. *Sc* ending in *R*; palpi long; tibiae spurred; antennae usually 13-segmented *Tipulinae*.
Sc usually ending in costa; palpi usually short; antennae usually 14 or 16-segmented 4.
4. *Rs* only two-branched and tibiae spurred *Cylindrotominae* (p. 15).
Rs with three branches or tibiae without spurs *Limoniinae* (p. 18).
5. Ocelli present 6.
Ocelli absent 10.
6. Tibiae spurred at tip 7.
Tibiae without spurs; small flies with reduced venation 9.
7. *Rs* forking at or just before *r-m* ANISOPODIDAE (= Rhyphidae).
Rs forking (if at all) well beyond *r-m*.
8. Antennae placed below the compound eyes, near oral margin .. B' B'ONIDAE.
Antennae placed near middle of the compound eyes MYCETOPHILIDAE.
9. Antennae short, the segments short, broad and not easily distinguished; bare, usually black flies with bare wings; abdomen with only seven pregenital segments SCATOPSIDAE.
Antennae usually larger, segments well separated; more hairy flies with at least a conspicuous fringe to the wings; abdomen with eight pregenital segments as usual CECIDOMYIIDAE, subfam. *Lestremiinae*.
10. Ten (in some Psychodidae eleven) veins or their branches reaching wing-margin 11.
At most eight veins or vein-branches reaching wing-margin 13.
11. Main cross-veins near or beyond middle of wing; larger, long-legged flies 12.
Main cross-veins near base of wing; small, hairy, moth-like flies PSYCHODIDAE.
12. Vein R_{4+5} forked; first antennal segment larger than second; tibiae with spurs; superficially resembling Tipulidae PTYCHOPTERIDAE (Liriopidae).
Vein R_{4+5} simple; first antennal segment rudimentary, second enlarged; tibiae without distinct spurs CULICIDAE.
13. Only four (or even fewer) veins reaching margin; first two antennal segments subequal; first segment of tarsi very short CECIDOMYIIDAE (Itonididae).
Six (sometimes seven or eight) veins reaching margin; first antennal segment rudimentary, second more or less enlarged; first tarsal segment nearly always longer than second 14.
14. Cross-veins near base of wing; seven veins reaching margin, but *M* simple THAUMALEIDAE (Orphnephilidae).
Cross-veins (when present) near middle of wing 15.
15. Wings very broad; *M* forked; antennae short and bare SIMULIIDAE (Melusinidae).
Wings not very broad; antennae hairy, especially in ♂ 16.
16. Vein *M* forked; wings superposed flat over back (except in one species) CERATOPOGONIDAE (Heleidae).
Vein *M* simple; wings not superposed (except in *Podonomus*) CHIRONOMIDAE (Tendipedidae).



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The total number of British species of short-palped crane-flies at present known is 214 (excluding a few varietal forms), of which 16 (marked * in the descriptions which follow) are recorded for the first time in this paper. I have endeavoured to give a sufficiently clear account of the distinctions between all these species to enable the British student to determine them without reference to any other work. All the species are represented in the British Museum collections, and all the descriptions and figures (except text-figs. 9 and 10) have been specially made for this work from a re-study of actual specimens. Naturally it is to be anticipated that some additions will eventually be made to this list, and a few of those Continental species which are most likely to be found to occur in Britain are mentioned in the text.

Photographs are given of the wings of all those species which exhibit a distinctive wing-pattern, and it is hoped that these photographs will be sufficient to show what attractive subjects these insects are for study.

The classification and nomenclature adopted is practically that of Alexander, with some few modifications in detail which seem to the writer to be desirable; in order to explain and justify these modifications it has been necessary to discuss generic and subgeneric characters somewhat fully. References to original descriptions of genera are omitted and discussions of purely nomenclatorial questions regarding them are minimised, as it is expected that these matters will be dealt with in a section of the work on 'Generic Names of British Insects' to be published by the Royal Entomological Society of London. The vexed question of the use of the names proposed by Meigen in 1800 is left for final decision by the committee responsible for the publication just mentioned, and in the meantime I have refrained from adopting any of these names.

In regard to the rather controversial questions of the limits of genera and the use of sub-genera, each student will probably have his own views. My own strong preference is to use generic names in a wide sense and discard all those which are based solely on secondary sexual characters or which cannot be accurately defined owing to the occurrence of intergrading forms. At the same time, I feel that there is some use in retaining as subgenera some of those smaller groups which have been most generally recognised, or which are clearly definable entities in a local fauna such as that of Britain. Those who wish can treat these subgenera as genera, but for myself I am convinced that the reverse process would usually be preferable and that on the ground of convenience and simplicity a great many names used in a subgeneric or even generic sense in the Diptera would be better discarded. I believe that the prevalent tendency in ento-

mological taxonomy to split and re-split the genera as used, say, fifty years ago has merely opened the flood-gates to a spate of charlatanry without advancing the science to any commensurable extent.

In this account of the British species the known distribution of each is indicated very briefly; to economise space and time in dealing with this aspect of the subject I have omitted exact localities and collectors' names except in the case of some of the rarer species, and in most other cases have merely indicated the area or given lists of counties from which records are available; in compiling these lists I have doubtless overlooked some published records, and have deliberately omitted some which appear to need confirmation.

The synonymy given is for the most part based on my examination of the types; nearly all the types of species described by Walker are in the British Museum, and all his names are mentioned in the synonymy.

The most helpful general works on crane-flies are those of Osten-Sacken and Alexander on the American species. No such complete and informative works on the European crane-fly fauna have been published, but a great deal of information has been provided by De Meijere, Nielsen, Tonnoir and Goetghebuer, Pierre, Lackschewitz and others, the titles of whose works are listed in the short bibliography appended to this revision. All this work is rather badly in need of collation (Pierre's attempt in this direction in the *Faune de France* was not satisfactory). For the British species no complete set of keys has been published, those of Verrall (1885) and myself (1921) being only partial.

CHARACTERS USED IN TAXONOMY.

For details regarding the morphology and classification of crane-flies the works of Osten-Sacken and Alexander should be consulted, but it is necessary to give a brief account here in order to explain the terms here used; in regard to the wing-venation and the structure of the tip of the male abdomen, which are the most important features of the insects for purposes of taxonomy, different terms and different interpretations of homology have been employed by different authors.

It is important to note that in very many Tipulidae striking abnormalities of venation are of very frequent occurrence, and when (as is often the case) the variation from the normal is the same on the two wings difficulties of determination may arise.

HEAD.

Eyes.—The size of the eyes (and consequently the width of the front) may give useful specific or subgeneric indications (as

in *Limonia*). In most cases the eyes are alike in the two sexes, but in a few species (as in some *Erioptera*) the eyes are larger, and the front consequently narrower, in the male than in the female.

Antennae.—The number and shape of the segments of the antenna, as well as the nature of the longer, stiffer hairs (*verticils*) and shorter *pubescence* on the segments of the flagellum, merit careful attention; it is important to distinguish between the two types of antennal hairs. The antennae are very often longer in the male than in the female, and the segments may be different in shape and vestiture in the two sexes. These secondary sexual differences have sometimes been used for defining genera but such usage is now generally discarded, however striking the differences may be.

Rostrum and mouth-parts.—The term *rostrum* is used to indicate a prolongation of the head-capsule beyond the eyes, while elongation of mouth-parts forms a *proboscis*. The position of the palpi, which are always attached to the distal edge of the head-capsule, will indicate where elongation has taken place. Except that certain species of *Dicranomyia* have reduced palpi, the structure of the mouth-parts offers few characters for classification.

THORAX.

The following parts are of importance in taxonomy:—

Pronotum: the dorsal part of the prothorax, which is divided into anterior and posterior portions; it is usually small, but in some genera and species is larger.

Praescutum: the main anterior portion of the mesonotum, in front of the V-shaped suture. It is often marked with three dark stripes, a longer median stripe reaching the front margin, and a pair of abbreviated lateral stripes; on the *interspaces* between the stripes *dorsocentral hairs* may be present. In many genera the praescutum shows one or two pairs of shallow depressions, the surface of which is usually more shining than the surrounding integument; these are the *humeral pits* (also called pseudosutural foveae) and the *anterior pits* (see text-fig. 13).

Scutum: the main central portion of the mesonotum, between the V-shaped suture and the scutellum.

Paratergite: a small, more or less projecting piece or strip at side of praescutum, from which it is separated by a furrow. Provides one of the minor distinctions between Tipulidae and Trichoceridae.

Postnotum: the part of the dorsum of the thorax behind the scutellum (also called mesophragma, and often, but incorrectly, the metanotum—the true metanotum in Tipulidae, as in nearly all other Diptera, is vestigial).

Pleurotergite: the part immediately adjacent to the post-

notum on each side; morphologically part of the postnotum but usually spoken of as belonging to the pleurae.

Pteropleurite: the part of the pleurae immediately below and posterior to the base of the wing. Like the postnotum and pleurotergite, it is only of importance in this group of insects because it may or may not bear hairs.

Meron: the part of the pleurae immediately adjacent and posterior to the middle coxa, separated from the rest of the pleura by a suture which may be indistinct. Its enlargement in some Eriopterini causes the wide separation of the middle and hind coxae.

LEGS.

The only features needing special attention are tibial spurs, claws and empodium. The spurs when present occur right at the tip of the tibia; they may be very small and may require a strong lens or a microscope for their detection; normally the front tibia has one spur, the others two each (formula 1.2.2), but in a few cases the number may be less (1.1.1 or 0.1.1). In cases of doubt, a true spur may be distinguished from a bristle or hair by having microscopic hairs or barbules on its surface, whereas hairs or bristles in all adult Diptera have their surface quite bare.*

The claws may be simple or may have one or more teeth on their under-surface near the base. The empodium (a median structure between the claws) may be present or absent.

(a) Veins.

WINGS.

The accompanying sketch of the wing of *Crypteria limnophiloides* (fig. 1) will explain the notation of the wing-veins and

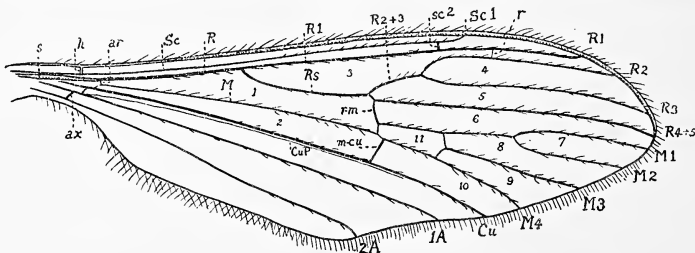


FIG. 1.

Wing of *Crypteria limnophiloides*, showing notation of veins and cells.
(For explanation see text.)

* I believe this distinction applies almost universally throughout the Diptera. In most Cyclorrhapha the structures, often called spurs, are entirely bare and are in fact merely bristles occupying the place of spurs; so far as I am aware, the only family of Cyclorrhapha in which true (pubescent) spurs are present is the Phoridae.

the intervening areas of membrane (cells) as used in this paper, this notation being essentially that of Comstock and Needham. The names applied to the veins are as follows:—

| Symbol. | Current name. | Names used by Verrall and others. |
|---------------------------------|---------------------------|-------------------------------------|
| – Sc | Subcostal. | Mediastinal. |
| Sc ₁ | Branch of subcostal. | Tip of mediastinal. |
| Sc ₂ | „ „ | Subcostal cross-vein. |
| + S | Thickened base of radius. | Stem-vein. |
| + R | Radius | } First longitudinal or subcostal. |
| + R ₁ | First branch of radius | |
| – R _s | Radial sector. | Praefurca. |
| – R ₂₊₃ | Branches of radius | } Second longitudinal and branches. |
| R ₂ , R ₃ | „ „ | |
| + R ₄₊₅ | „ „ | Third longitudinal or cubital. |
| – M | Media. | Fourth longitudinal. |
| M ₁ -M ₄ | Branches of media. | Branches of fourth. |
| + Cu | Cubitus. | Fifth longitudinal or postical. |
| – CuP | Posterior cubitus. | Fold in wing. |
| 1A | First anal. | Anal. |
| + 2A | Second anal. | Axillary. |
| h | Humeral cross-vein. | Humeral cross-vein. |
| ar | Arcular cross-vein. | — |
| r | Radial cross-vein. | Submarginal cross-vein. |
| r-m | Radio-median cross-vein. | Small cross-vein. |
| m-cu | Medio-cubital cross-vein. | Great cross-vein. |
| ax | Axillary cross-vein. | — |

Arculus. The connecting link between veins *R* and *Cu* at bases of basal cells.

Cord. The series of cross-veins and more or less transverse portions of veins at outer ends of basal and marginal cells.

Veins marked – are concave veins, that is to say, they occupy the bottom of furrows on the upper surface of the wing; those marked + are convex veins occupying the ridges.

Alternative notations and interpretations have been adopted by some writers for certain of the veins, of which the following are the most important:—

1. The radial cross-vein. Alexander believes that this is not a true cross-vein, but represents the second branch of the radius, which has become fused distally with the tip of R_1 instead of ending in the costa. According to this theory the tip of R_1 becomes R_{1+2} , R_{2+3} becomes R_{2+3+4} and R_2 , R_3 and R_{4+5} become R_3 , R_4 and R_5 respectively. I am prepared to believe that the R_3 and R_{4+5} of Comstock and Needham may perhaps be more correctly designated R_4 and R_5 , but have not adopted Alexander's innovation because I am not convinced that his interpretation of the apparent radial cross-vein is in all cases correct. The clue to the matter may be provided by the genus *Dicranota*, which has two apparent radial cross-veins, the distal one probably representing R_2 (as suggested by Alexander) and the proximal one r . In *Pediciini* other than *Dicranota* it seems that R_2 has been preserved, while r has disappeared, but in most other *Limoniinae* the position of the cross-vein suggests that the reverse is the true explanation. This conclusion is confirmed by the occurrence of abnormal specimens in the genera *Ormosia* and *Trichocera* with both R_2 and r preserved (one such



FIG. 2.

Abnormal specimen of *Ormosia lineata* with extra vein ($R_2?$).

is shown in fig. 2, and I have seen a similar example in *O. pseudosimilis*). Moreover, in *Molophilus* there appears to be a vestigial vein between R_1 and R_2 (fig. 26, f, g, h).

2. The medio-cubital cross-vein. It was thought by Comstock and Needham that the 'great cross-vein' of Tipulidae is not a true cross-vein, but represents the basal part of an upper branch of the cubitus (designated Cu_{1a}) which bends sharply outwards on reaching the discal cell (reaching the margin as Cu_1). This view prevailed for a time, until refuted by Tillyard, who again treated it as a cross-vein and regarded M as four-branched and Cu as simple. Although Tillyard's interpretation is accepted here for the Tipulidae, it is not impossible that $m-cu$ is compound in origin, the upper part representing the true cross-vein, the lower part the base of a lost branch of Cu . One small piece of evidence in favour of this is that one frequently

finds aberrant specimens of *Trichocera* (perhaps the most primitive genus of crane-flies) in which there is a slight bend or spur in the middle of *m-cu*, the lower part of the vein bearing hairs and the upper part being bare. (An analogous piece of evidence of the complexity of *m-cu* is also provided by the specimen of *Ormosia lineata* shown in fig. 2). If this is so it would imply that the ancestor of the Diptera had the cubitus forked distally (not simple as supposed by Tillyard) as well as having a four-branched media. It would then be unnecessary to consider, as Tillyard did, that in some families of Nematocera M_4 has been switched over to appear as a branch of the cubitus; on the contrary, we could divide the Nematocera into those which have lost Cu_1 but preserved M_4 (Tipulidae, Trichoceridae, Tanyderidae, Ptychopteridae, Psychodidae) and those which have preserved Cu_1 but lost M_4 (Bibionidae, Mycetophilidae, Culicidae, Chironomidae, etc.).

3. The 'third longitudinal vein.' Séguy and some other recent writers have propounded the theory that this vein is not in origin part of the radius at all but represents a vein called the anterior media (*MA* in the notation of Lameere) which has lost its original basal connections. This theory is based on the undoubted fact that in all Diptera the third longitudinal vein is definitely convex, whereas in some other orders all branches of the radial sector are said to be concave, including R_4 and R_5 ; but the evidence that any such vein as *MA* ever existed either in the Diptera or in their immediate ancestors (the groups related to the Mecoptera) appears to me to be very unconvincing. It is much easier to suppose that R_{2+3} has become rather more definitely concave and R_{4+5} more convex in the Diptera than was and is the case in the Mecoptera, where these veins are not very clearly either convex or concave.

(b) *Cells.*

The cells of the wing are named from the vein or part of a vein which limits their anterior border either entirely or proximally. The alternative, older names, which are still sometimes used, are as follows (the numbers 1-11 are as in fig. 1):—

- | | |
|--------------------|--|
| 1. Cell R . | Upper basal cell. |
| 2. ,, M . | Lower basal cell. |
| 3. ,, R_1 . | Marginal cell. |
| 4. ,, R_2 . | First submarginal (when present). |
| 5. ,, R_3 . | Second submarginal. |
| 6. ,, R_5 . | First posterior. |
| 7. ,, M_1 . | Second posterior. |
| 8. ,, 2nd M_2 . | Third posterior (or second, if M_1 is absent). |
| 9. ,, M_3 . | Fourth (or third) posterior. |
| 10. ,, M_4 . | Fifth (or fourth) posterior. |
| 11. ,, 1st M_2 . | Discal cell. |

(c) *Hairs.*

The hairs on the wing are of two kinds: (1) *macrotrichia*, which may be very small, but arise from distinct sockets; and (2) *microtrichia*, which are much smaller than macrotrichia and arise directly from the membrane of the wing without any sockets. The distribution of the macrotrichia on the veins and in a few genera on the membrane of the wing is of some taxonomic importance in the Tipulidae. The microtrichia, which cover the whole wing uniformly, are of less interest in this family; they are coarse (easily visible under a magnification of 100) in most Hexatomini, rather finer in most Limoniini, finer still in most Eriopterini, and extremely fine (quite invisible under a magnification of 100) in the genera *Taphrophila* and *Crypteria*.

MALE HYPOPYGIUM.

The term hypopygium has long been in common use amongst Dipterists to designate collectively the structures at the tip of the male abdomen, including the ninth and tenth segments and their appendages (in some cases, as in Tipulidae, including also the eighth segment). A typical hypopygium comprises the following parts: (1) *Tergite* and *sternite* of the ninth or genital segment; (2) the *proctiger* or anal segment; (3) the *forceps* or appendages of the ninth segment; (4) the *aedeagus*, a term used to denote collectively the often complicated chitinisations of the genital tube and its orifice. It is necessary to describe in some detail the structure and relationships of these parts as they are developed in the groups of craneflies under consideration.

1. The ninth *tergite* usually forms a conspicuous plate at the base of the hypopygium, normally dorsal in position (in certain Eriopterini where the whole hypopygium is inverted it becomes ventral). The ninth *sternite* is primitively a separate ventral plate; in Limoniini it remains separate, but is often much reduced in size or absent; in typical Eriopterini it is quite large and only narrowly connected with the tergite on each side. In most Hexatomini the ninth segment forms a more or less complete chitinous ring, which may be formed either by the tergite and sternite becoming completely fused at the sides, or perhaps more probably by the tergite extending laterally and ventrally after the atrophy of the sternite (this condition seems rather clearly indicated in the subgenus *Elæophila*, where the ventral lip probably represents the true sternite).

2. The *proctiger*. This term is now coming into general use for the anus-bearing part of the hypopygium or 'anal segment,' which represents morphologically the tenth abdominal segment together with the vestigial eleventh segment and the

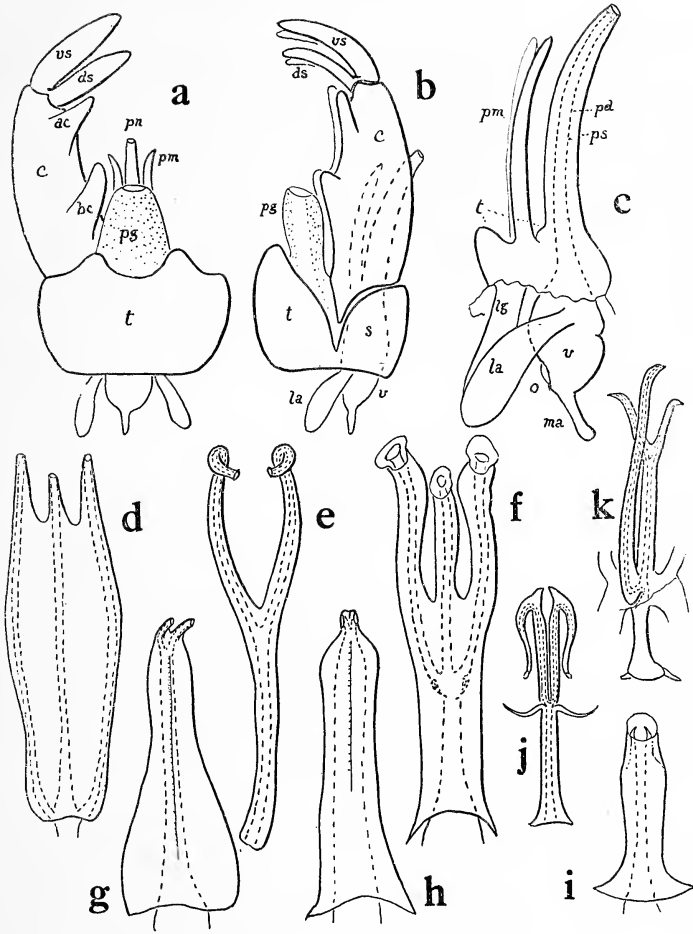


FIG. 3.

a-c. Diagrams showing parts of hypopygium in Limoniinae.

- a. Dorsal view of whole hypopygium. t, tergite; c, coxite; ac and bc, apical and basal lobes of coxite; ds, dorsal or inner style; vs, ventral or outer style; pg, proctiger; pm, paramere; pn, penis.
- b. Lateral view of whole hypopygium. Lettering as in a; s, sternite; v, vesica; la, lateral apodeme.
- c. Aedeagus in side view, further enlarged (see also Fig. 18). ps, penis sheath (or distal part of tegmen); pd, penis duct (ejaculatory duct); pm, paramere; t, tegmen; v, vesica; la, lateral apodeme; ma, median apodeme; o, orifice in vesica where vas deferens enters; lg, ligament connecting la and base of pm.
- d-k. Different types of penis. d, *Cylindrotoma*; e, *Diogma*; f, *Triogma*; g, *Limonia* (s.str.) *tripunctata*; h, *Limonia* (*Me'alimno'ia*) *bifasciata*; i, *Austrolimnophila*; j, *Ormosia* (*Rhypholophus*); k, *O.* (s.str.) *pseudosimilis*.

cerci. In many Nematocera (*e.g.* Ptychopteridae and Psychodidae) the proctiger is well developed, with conspicuous chitinisations, but in most Tipulidae it is almost entirely membranous and therefore of little or no taxonomic importance, exceptions occurring in the case of some species of *Dicranomyia* and in the subgenus *Scleroprocta* of *Ormosia*. Rare abnormal specimens are met with in which the cerci are present as in the female (in that sex the cerci form the conspicuous 'dorsal valves' of the ovipositor), the remaining parts of the hypopygium being normal; I have seen examples of this peculiar form of gynandromorphism in *Molophilus* and *Trichocera*.

3. The *forceps*. These form the conspicuous lateral clasping organs of the hypopygium and are morphologically appendages of the ninth sternite; in these groups of craneflies (in contradistinction to some other families of Nematocera) they are almost always separate from one another and from the sternite; they comprise a stout basal portion, the *coxite* (also called side-piece, pleurite or basistyle), and a smaller distal portion, the *style* (also called the clasper or dististyle). The coxite may bear various lobes or processes, either apically and ventrally (as in *Limonia*), apically and dorsally (as in *Gonomyia*) or basally and internally (as in some Hexatomini). The *style* in its primitive form is single and simple (as in *Trichocera* and *Ula*) but in the great majority of Limoniinae it is double, being more or less completely divided into an *outer style* and an *inner style* (sometimes more conveniently referred to as dorsal and ventral styles, the inner style being more dorsal in position). The two styles are usually folded inwards and often very different from one another in form. In some species of *Limonia*, including all the members of the typical subgenus, the dorsal style has disappeared (a secondary and not a primitive condition here); on the other hand, the genus *Gonomyia* is unique in the subfamily in that some of its species possess three separate styles on each coxite.

4. The *aedeagus*. The often complicated structures comprising the true genitalia can usually be distinguished from other parts of the hypopygium by the fact that they are devoid of the articulated hairs such as are characteristic of all sclerites of the body-wall; if hair-like structures or fine pubescence occur on the aedeagus (as in a few *Dicranomyia* and *Gonomyia*) the hairs have no articulated base. Except in the case of the few Eriopterine genera already mentioned, in which the whole hypopygium has become twisted through 180° , the aedeagus occupies a median ventral position; it is bounded by the posterior edge of the ninth sternite, the inner edges of the coxites, and the ventral surface of the proctiger—in other words it surrounds the genital opening which as in most other insects is situated

mid-ventrally between the ninth and tenth sternites. In considering the structure of the aedeagus the fact of first importance to realise is that it consists of two main portions: an *external* portion comprising the chitinisations surrounding the genital opening—parameres, tegmen, penis sheath; and an *internal* portion comprising chitinisations of the genital tube itself—vesica and its apodemes and ejaculatory duct. Some account seems desirable of the relationships of these various parts.

(a) *Parameres*. I have used this term for paired, moveable processes belonging to the outer wall of the aedeagus; they are termed gonapophyses by Alexander and others. On account of their position, at the base of the outer wall of the aedeagus where it becomes continuous with the inner surfaces of the coxites and proctiger, it is sometimes difficult to be certain whether the parameres actually belong to the aedeagus or not; in fact it may be that in some cases the structures called parameres have been derived rather from the coxites or proctiger, especially when, as is sometimes the case, two pairs are present. In this work the term parameres is, however, applied to all paired articulated structures in the position indicated.

(b) *Tegmen*. This is a median chitinous plate which is often to be found at the base of the aedeagus separating it from the proctiger; it is specially well developed in those forms where parameres are reduced or absent, and may extend laterally and ventrally round the base of the aedeagus, forming a more or less continuous ring. In some *Molophilus* it is produced into a median process covering the penis-sheath.

(c) *Penis*. This is the median portion of the aedeagus, and is typically a double-walled tube, the outer wall being the *penis-sheath* and the inner wall the *ejaculatory duct*. The penis-sheath may be a simple chitinised tube, separated at its base by an area of membrane from the tegmen, or may carry various processes which might be mistaken for parameres but are not articulated; sometimes it is almost entirely membranous, and in any case there is an area of membrane at its tip. The ejaculatory duct varies in diameter and thickness of its wall, and may be more strongly chitinised than the penis-sheath (as in *Lipsothrix* and *Elaeophila*). The penis as a whole varies much in length and in the nature of its tip; it may be a simple tube with a single terminal opening (as in most Hexatomini), or with two terminal openings (as in *Limonia*), or it may be deeply bifid (as in *Diogma* and some *Ormosia*) or trifid (as in *Cylindrotoma* and *Ormosia pseudosimilis*), each branch having its own separate opening. It seems very remarkable that such variations should occur within the limits of a single family or even genus. A very long, coiled, threadlike and partly eversible penis, such as

occurs in most or all Tipulinae, is never found in the Limoniinae, this being perhaps one of the most fundamental differences between the two subfamilies.

(d) *Vesica*. This is a bulb-like or ball-like internal structure at the base of the ejaculatory duct of the penis; it varies much in development, being sometimes very large and strongly chitinised, sometimes smaller and weaker and not well distinguished from the ejaculatory duct. It bears three expansions or *apodemes*, one on each side (often large and wing-like) and one in the middle of its inner aspect. On its dorsal wall is an aperture which marks the point where the united *vasa deferentia* from the testes open into it. The lateral apodemes are, in the short-palped craneflies, connected with the bases of the parameres by very strong chitinised bars or ligaments; in the Tipulinae these bars are absent, so that the vesica lies free in the abdomen, and as there is a very wide area of membrane between the tip of the penis-sheath and the ejaculatory duct the latter is to a large extent eversible or retractile.

Most parts of the hypopygium can usually be seen fairly well in the dry specimen under a high magnification of a binocular microscope ($\times 80-100$), but in the case of the smaller species it is often a great advantage or even essential to prepare a balsam mount. This can be done very easily in a few minutes by the following method:—

(1) Cut off the tip of the abdomen and place it in a small glass tube (preferably round-bottomed) in a small quantity of strong caustic potash solution. (2) Place this tube in an outer vessel containing a little water and heat it until the water just boils (alternatively, if due care be exercised, the tube may be heated for two or three minutes directly over a spirit or Bunsen flame). (3) Turn out the potash with the specimen into a watch-glass, and with a couple of needles under a binocular microscope separate the hypopygium from the terminal abdominal segments. (4) Transfer the hypopygium to another watch-glass containing *glacial* acetic acid; cover and leave for, say, five minutes (or any greater length of time). (5) Transfer to clove oil and leave for a minute or so. (6) Mount in a small drop of balsam, preferably on a small strip of transparent celluloid, which can be pinned beneath the rest of the insect, using *no coverslip* in order not to disturb the specimen by pressure. (When celluloid is used for mounting, creosote in any form must not be used as a preservative in the cabinet, as it discolours the celluloid. Should this occur, however, the specimen can be remounted very easily, especially if no cover-slip has been used, by softening with a drop of clove oil and transferring to another strip.)

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TIPULIDAE.

CYLINDROTOMINAE.

This group was at one time treated as forming a separate family, but is now recognised as deserving of no higher rank than that of a subfamily of Tipulidae. As compared with the tribes Limoniinae, the Cylindrotominae may be distinguished from the Limoniini and Eriopterini by having well-developed tibial spurs, and from the Pediciini and Hexatomini by having (except in the case of *Phalacrocer*) only three branches to the radius. A distinctive feature in the venation is that the tip of R_1 is atrophied, while r is strong and curved, forming an apparent continuation of R_1 , which seems to end in R_{2+3} . This feature is not entirely peculiar to the group, being found also in some species of *Limonia*.

The trifold penis of the male is a very remarkable feature of several of the genera, the only other Nematocera in which such

a structure is known to occur* being the Tanyderidae and Blepharoceridae (all genera) and also *Ormosia pseudosimilis*; but this cannot be quoted as a subfamily character of Cyliandrotominae because one of the European genera has a bifid penis; nor, in the light of other morphological characters, can the trifold penis be regarded as indicating a near relationship between the Cyliandrotominae and the Tanyderidae.

KEY TO BRITISH GENERA OF CYLIANDROTOMINAE.

1. Cell M_1 present (i.e. uppermost of the three veins arising from discal cell forked) *Cylindrotoma* Mcq.
 Cell M_1 absent (three single veins arising from discal cell) 2.
2. Vein R_2 absent 3.
 Vein R_2 present *Phalacrocera* Schin.
3. Head and thorax smooth *Diogma* gen.n.
 Head and thorax with deep punctures *Triogma* Schin.

CYLINDROTOMA Mcq.

(Pl. I, fig. 11.)

Antennal segments almost cylindrical; first segment remarkably short (in contrast with the other genera of the subfamily, in which it is normal). Thorax without obvious punctures. Wings with cell M_1 present, either sessile or (more usually) with a longer or shorter stalk. Discal cell very large, *m-cu* far beyond its base, usually near middle. R_2 absent; *r-m* distinct.

Hypopygium differing from the other three British genera in having two pairs of styles, the inner one smaller than the outer and fleshy (this may not be a constant character of the genus). Penis in the form of a flattened plate ending in three parallel prongs. Tergite not specially modified. No parameres.

Walker's *C. diversa* is unrecognisable, the type being lost. It was probably either *Phalacrocera replicata* or some well-known Limoniine species.

C. distinctissima Mg.

Head dull yellowish, with a black area above. Antennal scape yellowish, flagellum black. Thorax dull light yellowish; mesonotum with three nearly contiguous dull black stripes; a black spot at apex of postnotum and another on lower part of sternopleura. Femora with dark tips. Wings with the stigma small but usually distinct; length 9-11 mm.

Rather common in woods. Berks, Carnarvon, Cornwall, Devon, Glos., Hereford, Herts, Renfrew, Somerset. v-vi, viii.

* A trifold appearance is also seen at the tip of the penis of many Tipulinae, but in such cases the division is only in the apical part of the eversible ejaculatory duct, the penis-sheath not being affected.

Apart from the great variation in cell M_1 (noted in the generic diagnosis) other abnormalities of venation are rather frequent. Occasional specimens are found with an extra cross-vein in cell R_5 (as in the example figured), thus resembling the fossil genus *Cyttaromyia*.

DIOGMA gen. n.

(Pl. I, fig. 10.)

Antennae with first segment moderately long; flagellar segments almost cylindrical, as in *Cylindrotoma*. Thorax without obvious punctures, surface shining. Wings with cell M_1 absent (three simple veins arising from discal cell); discal cell moderately large, *m-cu* at or near its base; R_2 absent; *r-m* distinct.

Hypopygium: tergite with enormously developed lobes; only one pair of lobed styles; parameres present, each with two finger-like lobes pointed in opposite directions; penis deeply forked, with only two recurved prongs.

Genotype: *Cylindrotoma glabrata* Mg.

The European *C. glabrata* was one of the two species originally included by Osten-Sacken in 1859 in his genus *Liogma*, and it has consistently been placed in *Liogma* since that date, although the North American species (*L. nodicornis* O.-S.) has been selected as the genotype. *L. nodicornis*, however, differs from the European species rather conspicuously in the form of the antenna, with the flagellar segments enlarged beneath (this being one of the chief characters given for *Liogma* by Osten-Sacken), and also, as I now find, in the hypopygium. In *L. nodicornis* the hypopygium has just the same type of structure as in *Triogma trisulcata*, differing only in small details which are more of specific than generic importance. In the European species, on the other hand, the modified tergite and the bifid penis are striking characters distinguishing it not only from *L. nodicornis* but equally from *Cylindrotoma*, *Triogma* and *Phalacrocera*. I therefore consider the erection of a separate category for *glabrata* is fully justified, even though it is not unlikely that most of the *Cylindrotominae* may eventually be included within a single genus.

D. glabrata Mg.

Head shining blackish above; yellowish beneath, with a black spot adjacent to each eye. Antennae extensively yellow towards base. Thorax coloured as in *C. distinctissima*, but rather conspicuously shining. Tips of femora not obviously darker. Wings with faint stigma; length 9-10 mm.

Woods. Glos., Herts, Midlothian, Morayshire, Notts. Somerset, Waterford, Westmorland, Yorks. vii-viii.

TRIOGMA Schin.

Antennae with flagellar segments rounded. Head and much of thorax (except for praescutal stripes) with numerous deep punctures. Wings with cell M_1 absent; *m-cu* well beyond base of discal cell; R_2 absent; *r-m* completely obliterated, R_{4+5} being in contact with the discal cell for a short distance.

Hypopygium: tergite unmodified; one pair of simple styles; a pair of simple parameres; penis divided near base into three subequal, stout, cylindrical tubes.

T. trisulcata Schum.

Head blackish, slightly grey-dusted; antennae and palpi black. Thorax blackish, slightly grey-dusted; pteropleura and hypopleura yellowish. Abdomen brownish. Legs dark. Wings rather smoky; length 9-10 mm.

Open or moorland bogs. Hereford, Perth, Renfrew, Yorks. v.

PHALACROCERA Schin.

(Pl. I, fig. 12.)

Antennae with flagellar segments almost cylindrical and almost bare. Thorax without obvious punctures. Wings with cell M_1 absent (three simple veins arising from discal cell); *m-cu* near base of discal cell; R_2 present (in British species); *r-m* distinct.

Hypopygium much as in *Triogma* except that there are no distinct parameres.

P. replicata L.

Syn. ? *diversa* Walk.

Head blackish, antennae and palpi black. Thorax blackish, dusted with grey, especially between the three praescutal stripes; posterior part of pleurae largely yellowish. Abdomen reddish-brown to dark brown. Legs dark. Wings smoky; length 10-14 mm.

Mossy pools. Aberdeen, Berks, Devon, Herts, Middlesex, Somerset, Sussex, Yorks. iv-ix.

LIMONIINAE.

This subfamily includes the great majority of the smaller craneflies, in contrast with the Tipulinae, which includes most of the larger forms. Apart from the mere matter of size, the most obvious distinctions between the two subfamilies are as follows:—

Tipulinae: Head-capsule nearly always produced below the eyes into a short thick rostrum or trunk, at the tip of which, above the mouth-parts, is usually a small hairy projection or

nasus. Palpi nearly always long, especially the last segment. Wings with vein *Sc* apparently ending in *R*, its true tip (*Sc*₁) being atrophied (with rare exceptions); *Cu* almost always with a slight upward indentation at *m-cu*, which is usually placed close to the fork of *M*₄₊₅. Penis usually eversible; vesica free.

Limoniinae: Head-capsule seldom produced into a rostrum, or if a rostrum is present it is without a nasus. Palpi nearly always short, the last segment not much longer than the rest (except in *Pedicia*). Wings with *Sc* almost always ending distinctly in costa (*Sc*₁ present), *Sc*₂ usually in the form of a vertical cross-vein; *Cu* almost always straight, without any upward indentation at *m-cu* (*Pedicia* is again an exception); *m-cu* usually placed well before fork of *M*₃₊₄ (but exception occurs in *Pediciini* and *Hexatomini*). Penis not eversible; vesica not free.

These distinctions are neither important nor definite, and are certainly not sufficient to warrant the segregation of the two groups as distinct families, as is done by some authors.

The distinctions from the Trichoceridae are mentioned under that family (p.152).

The habit of the males of congregating in dancing swarms, especially in the late afternoon, is common to most genera of this subfamily (as well as to the Trichoceridae). This is another minor distinction from the Tipulinae, in British species of which subfamily, so far as I am aware, the swarming habit is never found; on the other hand, it is not universal in the Limoniinae.

The subfamily Limoniinae is now divided into four tribes, and as far as the British fauna is concerned these may readily be distinguished by the following key:—

1. Radius three-branched (vein *R*₂₊₃ simple, one submarginal cell); tibial spurs absent LIMONIINI.
- Radius four-branched (vein *R*₂₊₃ forked, two submarginal cells) 2.
2. Tibial spurs present, even if small; cell *M*₁ nearly always present 3.
- Tibial spurs absent; cell *M*₁ absent (except in *Crypteria* and *Neolimnophila*) ERIOPTERINI.
3. Eyes pubescent; *Sc*₂ near middle of *Sc* PEDICIINI.
- Eyes bare; *Sc*₂ near tip of *Sc* HEXATOMINI.

LIMONIINI.

The members of this tribe are readily distinguishable from other craneflies occurring in Britain by the simple vein *R*₂₊₃ (in other words the presence of a single submarginal cell) and the spurless tibiae; the *Cylindrotominae* have a single submarginal cell but spurred tibiae, and the *Eriopterini* have spurless tibiae but two submarginal cells.

In some respects the Limoniini (or at least the species of *Limonia*) show more affinity with the Tipulinae than do the other tribes of Limoniinae, as for example in the structure of the base of the radial vein (with a knot or break instead of a

bend below the humeral cross-vein), the form of the tip of R_1 , and the reduction in the number of antennal segments. The tribe consists mainly of the large and complex genus *Limonia*; five other small genera are included, but their relationships are somewhat uncertain. No member of the tribe possesses more than four posterior cells (*i.e.* cell M_1 is never present); a reduction to three posterior cells occurs in some species. Anterior pits on the praescutum are never present, and in the typical form humeral pits are absent or very small. In the male hypopygium the ninth sternite is usually reduced or sometimes absent.

KEY TO BRITISH GENERA AND SUBGENERA OF LIMONIINI.

1. Antennae 14-segmented; r always present (*Limonia* sens lat.) 2.
Antennae 16-segmented 7.
2. Tip of R_1 long and horizontal (Pl. II, fig. 5-11) 3.
Tip of R_1 short and vertical (r often appearing like tip of R_1 and curving down into R_{2+3}) (Pl. II, figs. 1-4, 12-20) 4.
3. No anal cross-vein *Limonia* Mg., s.str.
A cross-vein connecting veins 1a and 2a distally *Discobola* O.-S.
4. Sc long, reaching far beyond base of R_s ; claws with several strong teeth *Metalimnobia* Mats.
 Sc usually ending nearly opposite base of R_s , rarely much beyond; claws with a single basal tooth 5.
5. Mouth-parts as long as head and thorax together *Geranomyia* Hal.
Mouth-parts not or scarcely as long as head 6.
6. Antennae simple *Dicranomyia* Stephens.
Antennae in ♂ pectinate, in ♀ with the flagellar segments slightly enlarged beneath *Rhipidia* Mg.
7. Sc running close to R_1 for its whole length; distal part of R_1 in contact with costa; R_s long and straight (Pl. I, fig. 18) . *Taphrophila* Rond.
 Sc not unusually close to R_1 ; distal part of R_1 not in contact with costa 8.
8. r present; $m-cu$ far before outer end of lower basal cell 9.
 r absent; $m-cu$ not or but little before end of lower basal cell 10.
9. Upper branch of M forked; praescutum produced over pronotum (Pl. I, fig. 17) *Thaumastoptera* Mik.
Lower branch of M forked; praescutum not produced over pronotum (Pl. I, fig. 16) *Orimarga* O.-S.
10. R_s very long and running close to and parallel with R_1 ; $r-m$ as long as usual; rostrum short (Pl. I, fig. 19) *Elliptera* Egg.
 R_s shorter, not running close to R_1 ; $r-m$ very short or absent; rostrum longer than head (Pl. I, fig. 20) *Helius* St. Farg.

LIMONIA Mg.*

This name is now used to include several groups which were till recently treated as separate genera: *Limnobia*, *Discobola*, *Geranomyia*, *Dicranomyia* and *Rhipidia*. The distinctions between most of these, always admitted to be unimportant, break down completely when the fauna of southern and eastern Asia

* The earlier name *Amphinome* Meigen (1800) is of doubtful validity and applicability.

is considered. The five groups mentioned, together with one more which is here split off from *Limnobia*, are admitted as subgenera in this paper. The characters distinguishing the enlarged genus *Limonia* from one or more of the other genera with spurless tibiae and a single submarginal cell are very definite. They are:—

Antennae 14-segmented (rarely with an appearance of 15 segments owing to terminal segment being constricted in middle). Humeral pits usually very small and dotlike, sometimes absent. Claws toothed; empodium rudimentary. Wings with a more or less definite break (or at least a nick on posterior margin) in radius at level of arculus. A cross-vein connecting R_1 and R_{2+3} . R_s often short, if moderately long then curved or angled at base and not running specially close to R_1 . Hypopygium with the tergite and sternite completely separated, the sternite reduced in size and often entirely absent (this feature distinguishing *Limonia* from most or all other Limoniinae). Penis a simple chitinised tube with two openings at tip (tip sometimes bifid).

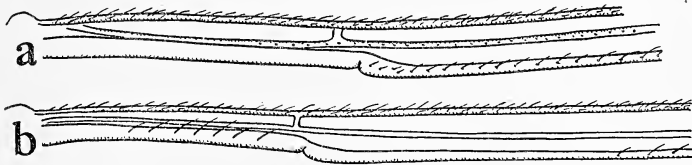


FIG. 4.

Anterior portion of base of wing in two subgenera of *Limonia*, to show trichiation of subcosta and base of radius, also deep indentation of lower edge of radius below humeral cross-vein (characteristic of Limoniini and Tipulinae). a, *Metalimnobia (quadrinotata)* Mg.: bare stem-vein (basal section of R), macrotrichia on under-surface of Sc (indicated by dots). b, *Limonia* s.str. (*nubeculosa* Mg.): setose stem-vein, bare Sc and base of R (beyond humeral cross-vein).

Subgenus **METALIMNOBIA** Mats.

(Pl. II, figs. 1-4.)

I propose to include in this subgenus three British species which have usually been placed at the head of the genus *Limonia* (*Limnobia*). They agree with *Limonia* s.str. in having a long Sc, several strong teeth on the claws, and a moderately wide frons, but differ as follows: Tip of R_1 short and vertical; Sc bearing macrotrichia on its under-surface for almost its entire length; basal section of R either bare (*bifasciata*, *quadrinotata*) or with an irregular double row of macrotrichia (*quadrinotata*) but in either case the whole of the vein beyond the arculus

setose (see fig. 4, a); pteropleurite bare; male hypopygium with the style differing in form from that of *Limonia* s.str., though without the enlarged fleshy lobe of *Dicranomyia*; penis not bifid at tip.

Species of this subgenus are rather numerous outside Europe, e.g. *L. triocellata* O.-S., *cinctipes* Say, *immatura* O.-S., *solitaria* O.-S., *fallax* Johnson and *novae-angliae* Alex. (N. America); *annulifemur* de Meij. and *yumanica* Edw. (Oriental Region); also probably *trichoptera* Alex. (a hairy-winged African species) and others.

In spite of their larger size and strongly toothed claws these species seem in some respects nearer to *Dicranomyia* than to *Limonia* s.str.; they also show some resemblances to the Oriental subgenus *Libnotes*.

The name *Metalimnobia* Matsumura has hitherto been of uncertain significance for Western workers, although Alexander concluded that it probably referred to some group of *Limonia* in the wide sense, on the assumption that Matsumura's description of the antennae as 16-segmented was incorrect. At my request Mr. Ichiji Okada has now re-examined Matsumura's type and sent me a drawing of the wing, thus establishing beyond a doubt that *M. vittata* Mats., 1911, is a species of *Limonia* closely related to the European *bifasciata* Schrank, possibly even the Japanese form of that species. The name *Metalimnobia* is therefore here employed in a subgeneric sense for the species of the *bifasciata* group; it is the only one of the numerous names that have been given to subdivisions of the large genus *Limonia* that is applicable to this group.

L. (M.) bifasciata Schr. (Pl. II, figs. 3 and 4.)

Syn. *xanthoptera* Mg.

Thorax shining orange-yellow; praescutum with a pair of black or (occasionally) brown stripes running the whole length, on each side of these posteriorly a small black or brown spot usually present; scutum with a pair of narrow blackish stripes. Abdomen mostly yellowish; a median dorsal row of blackish spots usually present. Legs yellowish, tips of femora narrowly black. Wings yellowish, more orange towards costa; a dark brown seam (variable in amount) over cord and tip of R_1 , and a dark brown spot over base of R_s , sometimes quite small, sometimes extended right across upper basal cell). Wing-length 11-17 mm.; ♀ smaller than ♂.

Hypopygium: Style almost entire, only slightly bifid at tip; parameres hairy at tip.

In fungi; rather common. Britain to Ross. vii-xi.

L. (M.) quadrimaculata L. (Pl. II, fig. 1.)Syn. *annulus* Mg.

Thorax scarcely shining, light brownish; praescutum with four dark brown or blackish stripes, inner pair divergent anteriorly, outer pair shorter and broader; postnotum dark right across at base. Abdomen with more or less complete blackish bands close to posterior margins of tergites. Femora with two dark rings, one at tip, the other separated from it by a pale ring of about equal width. Wings with four conspicuous brown spots besides other brown clouds; no noteworthy variation. Wing-length 11-21 mm.; ♀ smaller than ♂.

Hypopygium: Style split into four (the dorsal and ventral fleshy parts separated from the deeply bifid horny central portion); parameres very hairy at tip.

In large fungi. Hants (New Forest), Essex (Epping). iv-v.

L. (M.) quadrinotata Mg. (Pl. II, fig. 2.)

Thorax much as in *quadrimaculata*, but postnotum with a blackish patch in each basal corner. Abdomen with dorsum largely dark (♂) or with a row of spots (♀), but not appearing banded. Femora dark at tips only. Wings somewhat as in *quadrimaculata*, but with 1-4 additional dark spots in upper basal cell, and spot at tip of R_1 solid (not including a pale area). Wing-length 9-15 mm.; sexes alike in size.

Hypopygium: Style almost as in *quadrimaculata*, but parameres quite bare, as in *nubeculosa* group.

Common. Britain to Sutherland. vi, viii-ix.

The only Irish specimen I have seen (a male from Cappoquin, Waterford) lacks the black tips to the femora, a condition which I have not seen in any English or Scottish example.

Subgenus **DISCOBOLA** O.-S.

(Pl. III, fig. 1.)

This is readily distinguished from all other subgenera of *Limonia*, and indeed from all other genera of the Tipulidae, by the presence of a strong cross-vein connecting the two anal veins near their distal ends. In other respects *Discobola* combines several features of *Limonia* s.str. and of *Dicranomyia*. The following characters are common to most if not all the known species of the subgenus: Sc extending far beyond base of Rs , Sc_2 near its tip; R before arculus devoid of macrotrichia; tip of R_1 produced well beyond the cross-vein; Rs long and curved; pteropleurite bare; claws with one strong tooth and one or two additional minute teeth; male hypopygium with

styles of the type of *Dicranomyia* except that the two spines are placed on the fleshy lobe instead of on the rostrum; penis slightly bifid at tip.

* **L. (D.) annulata** L. (Pl. III, fig. 1.)

Syn. *argus* Say.

Readily distinguished from other small craneflies by the wing-markings; the 'ocellate' pattern is found only in two other British species (*Epiphragma ocellaris* and *Ilisia maculata*), neither of which need be confused with *D. annulata* owing to the very different venation. Thorax light brownish, slightly shining, praescutum with three very ill-defined darker stripes. Femora with pre-apical dark ring. Wings with middle of lower basal cell clear. Halteres with blackish stem, extreme base and most of knob yellowish. Wing-length 7-10 mm.

Morayshire (Forres, 25.viii.1904, 1 ♂; J. J. F. X. King; specimen presented to the British Museum in 1936 by Glasgow University).

This species may possibly have been overlooked in Britain owing to its general similarity to the abundant *L. nubeculosa* or *L. flavipes*. It is widely distributed in North America and has also been recorded from Borneo under the name of *argus* Say. The identity of *annulata* and *argus* has not hitherto been established, but having carefully compared male specimens from Scotland, Sweden, Russia, Massachusetts and Borneo, I am satisfied that they belong to the same species.

The second European species (*caesarea* O.-S.) may also occur in Britain. It differs from *annulata* in its darker thorax, presence of small dark spots in middle of lower basal cell of wing, and yellow-stemmed halteres.

Subgenus **LIMONIA** Mg., s. str.

Syn. *Limnobia* Mg., etc.

(Pl. II, figs. 5-11.)

This subgenus has hitherto included two main groups of species in the European fauna. I now propose to restrict it to the group which includes the genotype, *tripunctata* F. This group is easily recognised by venation, particularly by the long, horizontal tip of R_1 . All the British species, and most of the exotic species, also have the following characters in common: Sc extending much beyond base of R_s (except in *macrostigma*) and entirely devoid of macrotrichia, Sc_2 near its tip; R with macrotrichia on its basal section (stem-vein) as far as arculus, then quite bare for some distance (see fig. 4, b); eyes rather widely separated above, less so on underside of head; pteropleurite with a few small hairs; claws with several strong teeth

(again except in *macrostigma*); male hypopygium with the style always single and simple, swollen at base, penis more or less distinctly bifid at tip; sternite absent.

The subgenus as now restricted is one of the most distinct of the whole genus; it will include such species as the North American *L. indigena* O.-S., *tristigma* O.-S., and *badia* Walk.; and the Oriental *nitobei* Edw., *lateromacula* Edw. and *kashmirica* Edw.

KEY TO BRITISH *LIMONIA* S.STR.
(excluding *Metalimnobia* Mats.).

1. Wings with at least a few slight clouds in basal cells 2.
Wings without clouds in cells 5.
2. Mesonotum shining black *maculipennis* Mg.
Mesonotum dull brownish, with or without stripes 3.
3. Femora with three dark rings *nubeculosa* Mg.
Femora with at most two dark rings (second faint if present) 4.
4. Femora with tip only dark; clouds on wings distinct *flavipes* F.
Femora with second dark ring indicated; clouds on wings very faint *dilutior* Edw.
5. Wings with three blackish dots towards costa 6.
Wings with at most two faint dark dots 8.
6. Femora with pre-apical dark ring; apical wing-margin clear; thorax almost entirely yellowish *tripunctata* F.
Femora dark at tip; apical wing-margin blackened 7.
7. Thorax yellow with median black stripe *nigropunctata* Schum.
Thorax black *masoni* Edw.
8. Sc reaching far beyond base of Rs, as usual; femora with tips black ... 9.
Sc reaching only slightly beyond base of Rs; femora with extreme tips whitish *macrostigma* Schum.
9. Head blackish; thorax with three stripes *trivittata* Schum.
Head yellowish; thorax with one stripe *stigma* Mg.

L. (L.) nubeculosa Mg. (Pl. II, figs. 6 and 7.)

Head dark greyish; antennae black except for base of third segment; one very long dorsal hair on each segment. Thorax dull pale brownish; praescutum with three separate and equally broad dark brown stripes, the middle one occasionally indistinctly divided by a pale line; pleurae mottled. Abdomen dark brown above, posterior margins of tergites yellowish, also venter. Femora with three dark rings, outermost at tip, innermost not well defined, middle one separated from the others by pale rings of equal breadth. Wings mottled, the extensive markings including a patch in middle of lower basal cell; vein *Cu* with a yellow area before the cross-vein. Wing-length 9-11 mm.

Abundant in shady places in woods, etc., throughout Britain. v-vi, ix-xi.

There is normally little variation in wing-markings, but a curious aberration was taken by Mr. H. Audcent at Kings Weston, Glos. (Pl. II, fig. 7).

L. (L.) flavipes F. (Pl. II, fig. 5.)

Head dark greyish; antennae all blackish, flagellar segments each with two or more long hairs. Thorax dull, ground-colour light brownish; praescutum usually more or less darker in middle, clearer towards sides, with an oval brown area touching lateral margin; pronotum blackish; pleurae mottled. Abdomen dark brown, anterior margins of tergites yellowish. Femora with only the tips dark, preceded by an indistinctly paler ring. Wings mottled, but less extensively so than in *nubeculosa*, markings ill-defined; vein *Cu* all dark. Wing-length 9-11 mm.

Common. Sussex and I. of Wight to Sutherland. v-vii.

In light specimens the praescutum may be pale brownish except for the lateral dark area; on the other hand, some Scottish specimens have the praescutum almost uniformly dark brown, with paler sublateral areas only faintly indicated.

L. sylvicola Schum., a widely distributed European species closely allied to *flavipes*, may be expected to turn up in Britain. It is paler than *flavipes*, with the wing-markings much fainter, pleurae uniformly yellowish; legs as in *flavipes*.

L. (L.) dilutior Edw. (Pl. II, fig. 8.)

Head dark greyish; antennae all blackish except base of third segment; verticils shorter than in *nubeculosa* or *flavipes*. Thorax dull dark brownish-grey, without distinct markings but praescutum with a broad slightly shining median stripe. Abdomen mainly dark, sternites yellowish basally. Femora dark at tip and with a second dark ring faintly indicated. Wings slightly clouded, markings somewhat as in *flavipes*, but fainter. Wing-length 7.5-8.5 mm.

Among broom. Beds, Bute, Cheshire, Haddington, Herts, Inverness, Notts, Ross and Cromarty, Sutherland, Yorks. v-vi, viii-ix.

L. (L.) maculipennis Mg. (Pl. II, fig. 9.)

Syn. *analisis* Mg., *nitida* Verr.

Head black, frons somewhat grey-dusted, antennae all black, verticils not very long. Thorax black, mesonotum shining, pleurae grey-dusted. Abdomen with tergites 1 and 6-8 black, 2-5 yellow with posterior corners black (♂) or with narrower or broader posterior black bands (♀). Femora with black tips, front femora also with a broad black band in middle. Wings with three small blackish spots near front margin and small dark clouds in basal cells. Wing-length 6-10 mm.

Local. Cambs, Essex, Herts, Kent, Notts, Oxon., Salop, Suffolk. iv-v.

L. (L.) nigropunctata Schum. (Pl. II, fig. 10.)

Head black, scarcely dusted; antennae black, base of flagellum yellowish, verticils short. Thorax shining yellow, pronotum and a broad median stripe on anterior half of praescutum shining black. Abdomen black, bases of segments 3-6 more or less yellowish. Front femora black except on basal third and sometimes with an indistinct pale pre-apical ring; middle and hind femora yellow with black tips. Wings with small black dots at base of *Rs*, tip of *Sc*, and over *r*, apical margin blackish, narrow dark seams over cross-veins. Wing-length 9-12 mm.

Local. Carnarvon, Essex, Hants, Hereford, Herts, Leicester, Notts, Oxon., Salop, Sussex. v-viii.

A female in the Cardiff Museum from Timworth, Suffolk (Nurse), has three broad subconfluent blackish stripes on the praescutum, thus approaching *masoni*, but with legs as in *nigropunctata*.

L. (L.) masoni Edw.

Resembles *nigropunctata*, but thorax and abdomen nearly all black (including whole of praescutum), and front femora (like the others) black at tip only.

Derbyshire, Norfolk, Oxon. vi.

L. (L.) tripunctata F. (Pl. II, fig. 11.)

Head mostly blackish, heavily grey-dusted; antennae with scape and much of flagellum yellow, verticils rather short; palpi black. Thorax shining yellowish, pronotum and a small area on front of praescutum dark brown. Abdomen mainly yellowish, seventh segment more or less darkened. Legs yellowish, femora with a dark ring close to tip. Wings with small dark brown dots at base of *Rs*, tip of *Sc* and over *r*, otherwise almost clear. Wing-length 7-11 mm.

Common among long grass. Britain to Ross. v-vi.

L. (L.) trivittata Schum.

Much resembles *tripunctata*, but praescutum with three broad, rather ill-defined brown stripes; dark rings of femora at extreme tip; dark dots over base of *Rs* and tip of *Sc* only faintly indicated; *r* quite clear. Wing-length 9-11 mm.

Among butter-bur. Carnarvon, Inverness, Kincardine, Norfolk, Notts, Salop, Somerset, Warwick. vi-vii.

L. (L.) stigma Mg.

Syn. *punctigera* Walk.

Head yellowish, scarcely dusted; bases of antennae and palpi yellow. Thorax yellowish, slightly shining, pronotum and a short median stripe on praescutum blackish. Abdomen yellowish.

Femora with tips black. Wings almost clear, a small grey cloud over *r*. Wing-length 7-10 mm.

Carnarvon, Denbigh, Inverness, Merioneth, Midlothian, Oxon., Somerset. vii-ix.

L. (L.) *macrostigma* Schum.

Readily distinguished from all other species of the subgenus by venation, *Sc* extending only a short distance beyond base of *Rs*. Head blackish-grey; antennae all blackish, dorsal verticils very long. Thorax dull light brownish, pronotum blackish, praescutum with three dark brown stripes; pleurae largely dark. Abdomen largely dark brown, posterior margins of segments rather broadly yellowish. Femora with an ill-defined subapical dark ring, tips narrowly whitish. Wings almost clear except for an oval stigma which is more or less bisected by the cross-vein; this stigma is sometimes dark brown and very distinct, sometimes so faint as to be scarcely visible. Wing-length 8-11 mm.

Hypopygium of the type of *nubeculosa* and *tripunctata*, but parameres usually long and slender; penis long, moderately bilobed at tip.

Common. Britain to Inverness. v-vi, ix-x.

Several authors have mistakenly suggested that this is Meigen's *L. inusta*. The type of *inusta* in Paris is the same as *obscuricornis* Beling (*kuntzei* Schum).

Subgenus **DICRANOMYIA** Steph.*

Syn. *Furcomyia* Mg.,* *Glochina* Mg., *Numantia* Big.

(Pl. II, figs. 12-20; text-figs. 5 and 6.)

The large number of species belonging to this subgenus fall into several fairly well-defined groups, but the characters of these groups overlap to such an extent that it does not seem feasible to recognise them as separate subgenera. As regards the separation of *Dicranomyia* from *Limonia*, I now believe that the venation and trichiation of the wing, and also the characters of the claws and hypopygium, as long ago used by Osten-Sacken, are of more significance than the length of *Sc*, as used in recent years by myself and Alexander. The chief characters of *Dicranomyia* are:—

Mouthparts rather variable in development, but rostrum and labium together not or scarcely longer than remainder of head. Eyes (at least in all the British species) rather widely separated above. Antennae simple, alike in the two sexes. Pteropleurite

* *Furcomyia* is of earlier date than *Dicranomyia*, but has scarcely ever been used; *Dicranomyia* is retained here as being perhaps a permissible emendation of *Furcomyia*.

nearly always bare (a few small hairs present in *fusca*, *aperta*, *aquosa* and *sericata*). Claws usually with a single small tooth near base (rarely with an additional minute tooth at base). Wings with *Sc* usually ending about opposite base of *Rs*, rarely reaching middle of *Rs*. Base of radius always bare, a single row of macrotrichia commencing at or a little beyond arculus. Tip of R_1 short and turned up vertically to costa, but the vein connecting R_1 with R_{2+3} often rather long and curved, appearing like the tip of R_1 . Male hypopygium typically with two styles, the dorsal style forming a curved bare hook, the ventral style provided with a large outer fleshy lobe (representing its enlarged base) and a beak-like 'rostrum' pointing inwards, the rostrum usually bearing two spines; penis not bilobed at tip, the two terminal openings being side by side; a small hairy sternite usually present. This type of hypopygium is found in all groups of the subgenus, but various striking modifications occur, even among species which appear to be closely related (e.g. *autumnalis* and *sera*).

The trichiation of vein *Sc* varies considerably according to the species. In most of the typical species this vein is entirely bare (as in *didyma*, *goritiensis*, *chorea*, *mitis* var. *lutea*, *sera*, *modesta*, *stigmatica*, *halterella*, *ventralis*, *distendens*, *patens*); in some others (*ornata*, *lucida*, *consimilis*, *mitis*, *autumnalis*, *sericata*, *complicata*, *morio* group) the distal part of the vein bears hairs beneath; while in *fusca*, *aquosa*, *decemmaculata* and *dumetorum* almost the whole extent of the vein is hairy beneath, these four species showing in this respect as in venation an approach to *Metalimnobia*.

KEY TO BRITISH DICRANOMYIA.

1. *Sc* extending well beyond base of *Rs* 2.
Sc not extending appreciably beyond base of *Rs* 5.
2. Palpi 2-segmented; frons silvery; wings spotted ... *decem-maculata* Lw.
Palpi 4-segmented (normal); frons not silvery 3.
3. Wings spotted, at least towards costa. [Subg. *Rhipidia* or *Metalimnobia*.]
Wings at most with distinct stigma 4.
4. Wings hairy; discal cell closed *furca* Mg. ✓
Wings bare; discal cell open *aquosa* Verr. ✓
5. Sc_2 close to tip of Sc ; wings spotted 6.
 Sc_2 well before tip of Sc 9.
6. Wing-spots numerous, especially in cells [*Rhipidia maculata* Mg.]
Wing-spots few, none free in cells 7.
7. Frons silvery; two wing-spots *dumetorum* Mg. ✓
Frons not silvery; four wing-spots 8.
8. Thorax black; *m-cu* far before base of discal cell *ornata* Mg.
Thorax orange with black stripe; *m-cu* near base of discal cell
..... *lucida* de Meij.
9. Veins *R* and *Cu* largely yellow; wings more or less densely spotted,
usually along *Cu* *goritiensis* Mik.
Veins *R* and *Cu* not yellow, unless all veins are yellowish 10.
10. Wings with spots or clouds at tips of veins *1a* and *2a* 11.
Without such spots or clouds 12.

11. Thorax dull *didyma* Mg. ✓
 Thorax shining blackish *consimilis* Zett.
12. Praescutum not all shining black; frons dull 13.
 Praescutum shining black; frons silvery 27.
13. Apex of R_s darkened, even if only slightly; cross-vein not or scarcely
 beyond middle of Sc 14.
 Apex of R_s not at all darkened; cross-vein well beyond middle of Sc . .. 15.
14. A distinct spot at apex of R_s , extending into surrounding cells. *chorea* Mg.
 This spot less distinct, not extending into upper basal cell ... *mitis* Mg.
15. Last few antennal segments rather elongate, with long verticils 16.
 All flagellar segments shortly oval, with short verticils 18.
16. Palpi reduced, 2-segmented *ventralis* Schum. ✓
 Palpi normal, 4-segmented 17.
17. Discal cell closed *modesta* Mg.
 Discal cell open *patens* Lundst.
18. First antennal segment yellowish 19.
 Antennae all dark 20.
19. Thorax all yellowish *mitis* var. *lutea* Mg.
 Praescutum with dark median stripe *sera* Walk. ✓
20. Thorax yellowish, with a blackish central stripe (cf. also *danica* Nielsen)
 *autumnalis* Staeg.
 Thorax dark 21.
21. Praescutum with three dark stripes; wings without stigma .. *sericata* Mg. ✓
 Praescutum with at most an ill-defined median stripe 22.
22. Small species with open discal cell; Sc ending before base of R_s
 *aperta* Wahlgr. ✓
 Larger; discal cell normally closed; Sc reaching base of R_s 23.
23. Praescutum uniformly dark greyish; hypopygium not specially large or
 complex *distendens* Lundst.
 Praescutum darkened in middle; hypopygium large and complex 24.
24. Stoutly built, coastal species *complicata* de Meij.
 More slender, not coastal 25.
25. Stigma conspicuous, blackish (cf. also *mitis* var. *affinis* Schum.)
 *stigmatica* Mg.
 Stigma faint or absent 26.
26. Halteres normal *danica* Nielsen.
 Halteres unusually long *halterella* Edw.
27. Abdomen light reddish *rufiventris* Strobl.
 Abdomen largely black 28.
28. Abdominal sternites yellowish, at least posteriorly; coxae yellowish .. 29.
 Abdomen all black; coxae blackish 30.
29. R_s much shorter than R_{2+3} ; stigma distinct *morio* F. ✓
 R_s about as long as R_{2+3} ; stigma faint *occidua* Edw.
30. Processes of ninth tergite of ♂ moderate *caledonica* Edw.
 These processes very long *stylifera* Lack.

L. (D.) *decem-maculata* Lw. (Pl. II, fig. 12.)

Head blackish, with conspicuous silvery dusting on frons; antennae blackish, distal flagellar segments slender, verticils long. Palpi very short, 2-segmented. Thorax light brownish, praescutum with two narrow darker lines separating three broad paler stripes; scutum with a pair of dark lines close together; pleurae partly dark but not striped. Abdomen and legs dark brownish. Wings brown-tinged, with five dark grey spots, situated at tips of Sc , R_1 and R_2 and at each end of R_s . Sc reaching nearly to end of R_s , Sc_2 at its tip. Wing-length 7-11 mm.

Hypopygium of *Dicranomyia* type; fleshy lobe rather small, rostrum long, with a single spine (in British specimens; Lack-schewitz figures two very close together); sternite absent.

In fungi on old logs; locally common. Berks, Gloucester, Hants, Hereford, Herts, Inverness, Middlesex, Somerset, Sussex. v-ix.

L. (D.) fusca Mg. (1818).

Syn. *pilipennis* Egg., ? *pubipennis* O.-S., *turpis* Walk.

Head blackish, including antennae and palpi; antennae rather stouter but scarcely longer in ♂ than in ♀; flagellar segments without necks and with short verticils. Thorax blackish, somewhat shining, in ♀ sometimes with scutellum, middle of scutum, shoulders and sides of praescutum, and middle of pleurae yellowish. Abdomen entirely blackish above, venter rather light brownish. Legs brown, coxae and base of femora yellow. Wings slightly smoky, with brown stigma; membrane on most of distal half with rather dense pubescence. *Sc* long, reaching beyond middle of *Rs*, *Sc*₂ close to its tip. Wing-length 6.5-9 mm.

Hypopygium very similar in type to that of *chorea* and *mitis*; tergite simple, scarcely emarginate; coxite short, with short thick ventral lobe; fleshy lobe large, rostrum short; the two longish spines on a large tubercle close to base of rostrum; sternite present; anal segment partly sclerotised but not forming a rigid tube.

By shady running streams, local. Arran, Cheshire, Devon, I. of Wight, Kent, Lancs, Merioneth, Salop, Somerset, Yorks. vi-viii.

This species is at once distinguished from all other British species of *Limonia* (sens. lat.) by the pubescent wing-membrane. This cannot, however, be treated as a generic or subgeneric character because various exotic species belonging to different groups of the genus also have pubescent wings; some of these are obviously closely related to bare-winged species.

Meigen's type of *fusca* is missing from the Paris Museum collection, but it will be convenient to accept the suggestions of Verrall and Osten-Sacken that it was the same as *pilipennis* Egg., in which case the name *fusca* must be given priority. *L. fusca* has been designated as the type of *Numantia* Big.

A minor peculiarity of this species is that the small humeral 'pits' are in the form of slightly raised tubercles in front of instead of in the bottom of the humeral depression. Further, *L. fusca* shares with *aquosa* and *sericata* the peculiarity of possessing a few small pteropleural hairs, which are absent in nearly all species of the subgenus *Dicranomyia*. The claws have the single basal tooth usual in the subgenus.

L. (D.) aquosa Verr.Syn. *pedicellata* Edw.

Head blackish, including antennae and palpi; flagellar segments oval, with short bare necks and with rather long verticils. Thorax with praescutum shining blackish-brown; scutellum, postnotum and much of pleurae yellowish. Abdomen dark brown above, paler beneath. Legs brown, coxae yellowish. Wings nearly clear, with dark veins and fairly distinct stigma. *Sc* long, reaching about to middle of *Rs*, *Sc*₂ near its tip; discal cell open. Membrane bare as usual. Wing-length 5-7 mm.

Hypopygium distinctive in having the two rostral spines borne on the ends of long finger-like processes, one arising from base of rostrum and strongly curved, the other near tip of rostrum and almost straight. Fleshy lobe rather large.

Near waterfalls. N. Wales, Ross, Somerset, Sutherland, Westmorland, Yorks. vi-vii.

This is superficially like a small *L. fusca*, but I do not think the two are nearly related. From the other British species with open discal cell it is readily distinguished by the long *Sc*.

I described *pedicellata* from a damaged male from Corsica without comparison with specimens of *aquosa*. This comparison having now been made, it is obvious that the two are identical.

Another European species with long *Sc* and bare wings, which very probably occurs in Britain, is *inusta* Mg. (*obscuricornis* Beling, *strobli* Nielsen, *kuntzei* Schulze); the name appeared in old British lists, but all British specimens I have seen labelled *inusta* were wrongly determined. In this species the palpi are 4-segmented; pleurae with a dark longitudinal stripe; wings with distinct stigma but otherwise unmarked; eyes only very narrowly separated above. These features together distinguish the species sharply from almost all other species of *Limonia* in the European fauna, though numerous species of the group occur in the tropics; the name *Atypophthalmus* Brunetti (proposed for the Oriental *holopticus* Brunetti = *umbrata* de Meij.) might perhaps be applied in a subgeneric sense to the whole group.

L. (D.) dumetorum Mg. (Pl. II, fig. 15.)Syn. *transversalis* Walk.

A very distinct and isolated species at once recognised by its two wing-spots and silvery frons.

Head largely black, the frons moderately broad and conspicuously silvery. Antennae all black, verticils long, distal segments rather elongate. Thorax shining orange-brown, praescutum sometimes dark in middle; a broad dark brown stripe

on pleurae from neck to base of abdomen, pleurae below the stripe with white dusting. Abdomen usually with conspicuous yellowish bands at bases of segments, but sometimes mainly dark. Wings with slight clouds at tip and over cross-veins in addition to the spots at stigma and base of *Rs*. *Sc* reaching scarcely beyond base of *Rs*, *Sc*₂ at its tip. Wing-length 6-9 mm.

Hypopygium: Fleshy lobe small, rostral portion stout, without spines but with a tuft of fine pubescence; sternite absent.

Heaths and woods, common. Sussex and Cornwall to Sutherland. vi-ix.

L. (D.) ornata Mg. (Pl. II, fig. 13.)

Easily distinguished from all other British species of *Limonia* s. lat. by the four large brown or black spots on the wing and the greatly retracted position of *m-cu*. Head blackish; antennae with scape black, flagellum mostly yellow. Thorax almost entirely black or dark brown, rather shining. Abdomen blackish, posterior margins of tergites whitish. Legs yellow. Halteres with black knob. Wing-length 7-9 mm.

Hypopygium: Fleshy lobe rather large, rostrum short, spines short, one stout and dark, the other slender and pale; sternite present, small, hairy.

Among butter-bur; local. Derby, Hereford, Lanarkshire, Lancs, Somerset, Yorks. v-vi.

L. (D.) lucida de Meij. (Pl. II, fig. 14.)

Somewhat resembles *ornata* (with which it has sometimes been confused), but differs in the less extensive wing-markings, position of *m-cu* at base of discal cell, and in many other respects. Head dark brown, shining; antennae all blackish. Thorax shining, mainly orange-brown; pronotum, a sharply-defined broad stripe running whole length of praescutum, a roundish spot on each lateral margin of praescutum, two stripes on scutum, a spot in middle of pleurae and another on lower sternopleura black. Abdomen blackish, segments with broad yellow posterior bands. Femora with black tips. Wing-length 6-8 mm.

Hypopygium much as in *ornata*; rostral spines very short.

Boggy places, among reeds or butter-bur; local. Carnarvon, Cornwall, Devon, Dorset, Hants, Hereford, Herts, Oxford, Salop, Suffolk. vi-vii.

L. (D.) goritiensis Mik. (Pl. II, fig. 16.)

Easily distinguished in the typical form by having four or five dark spots along the costa (including a distinct small spot at tip of *R*₃) and numerous small spots along vein *Cu*, the intervening areas on this vein being yellow. Forms with reduced

wing-markings may be recognised by having *R* and *Cu* almost entirely and rather conspicuously yellow.

Antennae all dark, flagellar segments all oval, with very short verticils. Thorax dark, heavily grey-dusted; praescutum with three stripes, the middle one usually obviously divided by a pale line. Femora with sharply defined black tips. Cross-vein near middle of *Sc*, as in *didyma* and *chorea*. Wing-length 6-10 mm.

Hypopygium: Fleshy lobe small, pointed; rostrum rather long, spines long, black, widely separated; sternite present.

Wet coastal cliffs. Kent to Cornwall, Clare Island, Glos., Merioneth. iv-viii.

var. **cornubiensis** n. (Pl. II, fig. 17.)

Differs from the typical form in having the wing-markings reduced to a conspicuous stigma, a small spot over distal end of *Rs*, and a spot in upper basal cell below base of *Rs*. Hypopygium and other structural characters as in the typical form.

Cornwall (St. Ives Bay); specimens in British Museum (coll. Yerbury) and Oxford Museum (coll. Dale).

L. (D.) didyma Mg. (Pl. II, fig. 18.)

Syn. *oscillans* Hal., *trinotata* Mg.

Easily distinguished from all British species except *consimilis* by the three dark clouds towards anterior margin of wing, the first being midway between arculus and base of *Rs*, the second and third over base of *Rs* and at stigma. Antennae dark except for first segment; flagellar segments all oval, with short verticils. Thorax dark above, rather heavily dusted, appearing dull from in front, slightly shining from above or behind, without stripes; pleurae sometimes dark like dorsum, sometimes quite pale. Abdomen light to dark brown. Femora normally yellow with blackish tips. Wings in addition to markings noted above with clouds over cross-veins and at tip; rather faint clouds also at tips of *1a* and *2a*. Vein *Cu* entirely dark. Cross-vein near middle of *Sc*. Wing-length 8-10 mm.

Hypopygium: Tergite scarcely emarginate; fleshy lobe moderately large; the two rostral spines long and equal, very close together; a small hairy sternite present.

Common by running water. Britain to Inverness; Kerry. vi-ix.

A variety occurring in the Hebrides (Lunga Is.) has the femora mainly blackish.

L. (D.) consimilis Zett.

Differs from *didyma* as follows: Mesonotum shining blackish. Antennae rather longer, especially the terminal segments; verti-

cils rather long. Wings with the markings larger, darker, and more clearly defined; the spot over base of *Rs* extending across upper basal cell almost to *M*; rather large and distinct spots over tips of *1a* and *2a*. Cloud at wing-tip less extensive.

Hypopygium: Tergite much more emarginate; fleshy lobe very small; rostral spines rather shorter and stouter.

Inverness (Aviemore, Nethy Bridge). viii.

L. (D.) chorea Mg. (Pl. II, fig. 20; text fig. 5,a.)

A rather variable species, but usually if not always distinguishable from its allies by the wings having, in addition to a fairly distinct yellowish-brown stigma, a distinct brown or greyish spot surrounding the apex of *Rs* and extending into both the submarginal and upper basal cells. Dark specimens have slight clouds over the cross-veins, distal part of *Cu*, base of *Rs* and on the subcostal cross-vein (which is placed at the middle of *Sc*), but in lighter specimens these clouds are very indistinct or absent.

Body often extensively green in life. Antennae with scape more or less pale; flagellum blackish, segments all oval with short verticils. Thorax light to dark brownish, heavily dusted, praescutum without obvious stripes. Abdomen dark above, posterior margins of tergites usually conspicuously pale. Tips of femora usually rather obviously darkened; legs very slender. Wings rather iridescent; *m-cu* at or immediately before or beyond base of discal cell. Wing-length 6-9 mm.

Hypopygium: Fleshy lobe moderately large, about 1.3 times as long as broad, the two rostral spines very short, slightly separated, and well removed from the tip of the short rostrum; a small hairy sternite present.

Abundant throughout the British Isles.; ♂♂ hovering in swarms under trees in gardens, woods, etc. iv-x.

L. (D.) mitis Mg. (Pl. II, fig. 19; text fig. 5,b.)

A variable species resembling *chorea*, but distinguishable with a fair degree of certainty by the wings: apex of *Rs* with a very slight darkening which does not extend distinctly into the upper basal cell; the clouds on the cross-veins and base of *Rs* are faint or absent. Legs somewhat stouter than in *chorea*, and abdominal tergites without pale borders. Cross-vein somewhat beyond middle of *Sc*.

In the form which has been regarded as typical the antennae are all dark or with the scape only indistinctly pale; thorax with rather heavy brown dusting; mesonotum darker than pleurae but praescutum not distinctly striped; wings with obvious but not very dark stigma. Wing-length 7-10 mm.

Hypopygium: Fleshy lobe very large, nearly twice as long as broad, the two rostral spines long, equal, close together and close to tip of rostrum; tergite with a very shallow V-shaped emargination.

Very common in woods, etc. Sussex and Devon to Arran; Ireland. v-vi.

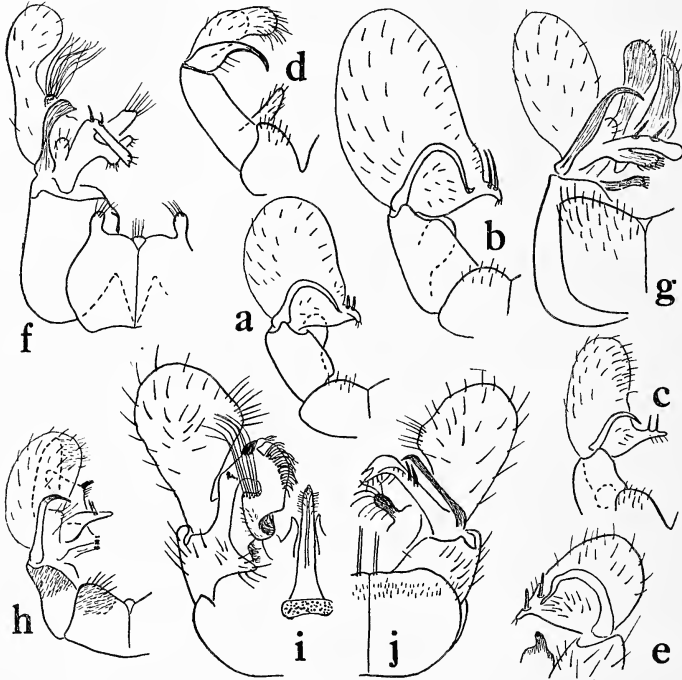


FIG. 5.

Hypopygia (tergite, coxite and styles) of *Dicranomyia*, from above: a, *chorea*; b, *mitis*; c, *zernyi*; d, *sera*; e, *ventralis*; f, *stigmatica*; g, *complicata*; h, *danica*; j, *halterella*; i, hypopygium of *D. halterella* from beneath. (e, i and j on a slightly larger scale than the rest.)

var. *affinis* Schum.

(Syn. *stigmatica* auct. nec Mg.)

Darker than the typical form; pleurae as dark as mesonotum; praescutum with a somewhat shining black median stripe and often with short lateral stripes; wings with stigma dark brown and fairly conspicuous.

Hypopygium as in typical *mitis*.

Common, woods and heaths. Hants, Herts; Scotland. iv-vi.

var. *lutea* Mg.

Lighter than the typical form; thorax almost entirely yellowish and with much less obvious dusting; abdomen mainly yellowish; antennal scape yellowish; wings almost completely clear, the stigma faint or absent. Also differs from typical *mitis* in lacking hairs on *Sc* (see p. 29).

Hypopygium as in typical *mitis*.

Common. Sussex and Devon to N. Wales.

Somewhat similar Continental species, possibly occurring also in Britain, are *incisurata* Lack. and *zernyi* Lack., both of which have the ninth tergite in ♂ much more deeply emarginate; in *zernyi* the rostrum is long and the spines rather unequal (fig. 5, c).

L. (D.) modesta Mg.

Head brownish-grey above, rostrum yellow. Antennae with first segment yellow, remainder black; last six or seven segments rather elongate, with rather long verticils. Thorax dull yellowish-brown, praescutum with a dark brown median stripe and usually also with lateral stripes. Abdomen and legs light brownish; ovipositor entirely pale. Wings clear, stigma faint; *Sc*₂ about 6-8 times its length from tip of *Sc*; *m-cu* at base of discal cell. Wing-length 6.9 mm.

Hypopygium yellow; tergite deeply bilobed; ventral process of coxite short; fleshy lobe rather large, densely pubescent on inner surface; rostral spines widely separated, almost straight.

Common. Britain to the Forth. vi-ix.

L. (D.) patens Lundst.

Head as in *modesta*. Thorax yellowish-brown, praescutum with three separate dark brown stripes, more or less obscured by brownish dusting; brown marks in middle of pleurae and lower part of sternopleura. Abdomen dark brown above, posterior margins of tergites pale. Ovipositor shining black at base beneath, as in *sera*. Wings clear, iridescent, with faint stigma. *Sc*₂ distant from tip of *Sc* by a distance about equal to length of *m-cu*. Discal cell open. Wing-length 6.9 mm.

Hypopygium (Continental specimens) resembling that of *modesta* in having the large fleshy lobes densely pubescent on the inner surface, but tergite with a much deeper median excavation on each side of which it is produced into a thumb-like process; the two rostral spines placed close together on a common tubercle and both strongly curved.

Inverness (Aviemore). 1 ♀, 10.viii.1911 (*Yerbury*).

L. (D.) ventralis Schum. (text fig. 5,e).Syn. *brevipalpis* Edw. MS. (Britten, 1922).

Distinguished from all other British species except *decem-maculata* by the very short, 2-segmented palpi.

Head dark brownish. Antennae entirely blackish; last seven or eight segments rather elongate-oval and with rather long verticils (nearly twice as long as the segments). Thorax rather light brownish, mesonotum somewhat shining, praescutum with three nearly contiguous dark brown stripes. Abdomen dark brown, venter and posterior margins of tergites pale. Wings nearly clear, without distinct stigma. Sc_2 not very far from tip of Sc (3-6 times its length). Discal cell closed or open. Wing-length 6-8 mm.

Hypopygium: Fleshy lobe large, somewhat transverse; the inner of the two spines situated on the lobe itself, the outer at the base of the short rostrum.

Hebrides (S. Uist), Hereford (Lecch Pool), Inverness (Nethy Bridge), Kent (Deal), Lancs (Freshfield), Morayshire (Forres), Somerset (Sharpham). viii-x.

This might perhaps be the species referred to by Meigen (1830, not 1818) as *L. fusca*.

L. (D.) sera Walk. (text-fig. 5, d).Syn. *disjuncta* Walk., *globata* Walk., *forcipula* de Meij., *discors* Kuntze.

A yellowish species much resembling *autumnalis* and some forms of *mitis*; differing from both in having a shining black spot at base of ovipositor beneath. Head yellowish-grey; frons rather wide. Antennae with first segment yellowish, remainder dark; flagellar segments all shortly oval, with short verticils. Thorax yellowish, brown-dusted, with a blackish median stripe anteriorly. Abdomen yellowish, with traces of a median dorsal dark stripe. Legs light brownish. Wings practically clear, rather narrower than usual, with less developed anal lobe; no stigma; Sc_2 4-6 times its length from tip of Sc ; *m-cu* usually before base of discal cell. Wing-length 6-9 mm.

Hypopygium very distinctive: coxite long, cylindrical; dorsal style broad and pale at base; ventral style fleshy but not enlarged, slightly bilobed but without rostrum or spines; sternite absent. This structure is totally unlike that of any other *Limonia* known in Britain, yet the species presents no other peculiarities of structure differentiating it from *Dicranomyia*.

Coastal marshes. Dorset, Essex, Glos., I. of Wight, Merioneth, Norfolk, Suffolk. v, ix.

L. (D.) autumnalis Staeg.

Head dark grey above, rostrum yellow. Antennae entirely blackish; flagellar segments shortly oval, with short verticils. Thorax yellowish with brownish-yellow dusting; middle of pronotum and a rather broad median stripe on praescutum blackish. Abdomen entirely yellowish. Legs yellowish-brown, tips of femora hardly darkened. Wings almost clear, stigma light brownish. Position of Sc_2 rather variable, from three to six times its length from tip of Sc . Wing-length 6-8 mm.

Hypopygium: Ventral lobe of coxite unusually long, pointed, directed downwards and provided with a tuft of yellow hairs; fleshy lobe narrowed at base, with a small club-shaped projection at base ventrally; rostrum long, spines close together at its middle; sternite very small.

Argyll, Arran, Dorset, Hants, Hebrides, Lancs, Nairn, Salop, Westmorland, Yorks. v-xi.

A male from Barra I. (*A. R. Waterston*) has the thorax entirely dark (without yellow tinge even on pleurae) and heavily grey-dusted.

L. (D.) sericata Mg.

Syn. *glabrata* Walk.

Head dark, dusted greyish, often almost whitish-grey on frons. Antennae all black, flagellar segments shortly oval with short verticils. Thorax dark, dusted ash-grey, praescutum with more brownish-grey dusting and three blackish stripes. Abdomen and legs mainly dark. Wings clear, without stigma, extreme base yellowish. Distance of Sc_2 from tip of R_1 subequal to length of Rs . Wing-length 7-10 mm.

Hypopygium distinctive on account of the long, curved, finger-like black ventral projection of the coxite; fleshy lobe large but transverse, rostrum short, spines near its base.

Common, especially on cultivated fields. Cambs., Hants, Herts, Kent, Notts, Oxon., Salop, Sussex. v-vi.

L. (D.) distendens Lundst. (text-fig. 6, a).

Dark greyish-brown, unmarked; praescutum not distinctly darkened in middle. Antennae blackish; last few segments rather thin, but with short verticils. Wings slightly tinted, with ill-defined stigma. Rs only slightly curved, about two-thirds as long as R_{2+3} . Distance of Sc_2 from tip of Sc about equal to length of *m-cu*. Discal cell normally closed. Wing-length 7-8 mm.

Hypopygium chiefly distinct by form of tergite, which is rather large, with a pair of triangular, blackened, hairy projections; ventral lobe of coxite rather large, with mammillate tip; fleshy lobe large; rostral spines rather short.

Argyll (Kilmun), Carnarvon (Bettws Garmon), Dumbarton (Luss), Hants (Matley Bog), Inverness. vi-vii.

L. (D.) stigmatica Mg. (text-fig. 5, f).

Head dark, including rostrum; dusting rather lighter on frons. Antennae all black, flagellar segments shortly oval with short verticils. Thorax dark, dusting on mesonotum brown, on pleurae grey; praescutum with an ill-defined darker median stripe. Legs brownish. Wings iridescent, clear, with conspicuous blackish stigma which is shortly oval in shape. *Rs* rather short, not much over half as long as R_{2+3} ; *Sc* ending about opposite base of *Rs*, Sc_2 about four times its length from tip of *Sc*. Wing-length 5-6 mm.

Hypopygium very large and complex; tergite large, pale, with a thumb-like projection at each corner and a small hair-tuft in middle of posterior margin; coxites large and greatly swollen, blackish; fleshy lobe long, clubbed, with a rather short, black, complex accessory ventral appendage bearing a tuft of long hairs; the two spines on the complex rostrum well separated; a small sternite present.

Mountain bogs. Argyll, Carnarvon, Hereford, Inverness, Montgomery, Morayshire, Perth. viii.

L. (D.) complicata de Meij. (text-fig. 5, g).

Resembles *stigmatica*, but of stouter build and with narrower wings; stigma conspicuous in some specimens, faint in others; Sc_2 rather variable in position, 2-4 times its length distant from tip of *Sc*. Wing-length 4-7 mm.; the wings are variable in development, sometimes fully developed, sometimes abbreviated; short-winged specimens may show degeneration of venation, e.g. open discal cell and presence of only three posterior cells.

Hypopygium somewhat resembling that of *stigmatica*, but differing in many details: tergite blackish like coxites, without thumb-like projections at corners and without group of hairs in middle of posterior margin; coxites much less swollen at base; accessory black appendage very long, clubbed, without long hairs; no hairs on the small sternite.

Coastal marshes. Argyll (Colintraive), Merioneth (Barmouth), Morayshire (Forres), Ross (Dingwall), Suffolk (Orford, Covehithe, Benacre). v, vii, ix.

Another species of this group which is widely spread in Scandinavia and may perhaps occur in Britain is *magnicauda* Lundst.; this is of slender build like *stigmatica* but has no definite wing-stigma; the hypopygium somewhat resembles that of *complicata*, but every part differs in detail, the whole organ being even larger and more complex than in *complicata*, with the sternite as large as the tergite.

L. (D.) danica Kuntze. (text-fig. 5, h).

Head dark greyish, including rostrum. Antennae all black; flagellar segments shortly oval with short verticils. Thorax rather light brownish, with heavy brown dusting; praescutum with an ill-defined blackish-brown median stripe. Legs pale. Wings rather iridescent, stigma faint. *Rs* long, almost as long as R_{2+3} ; *Sc* ending slightly beyond base of *Rs*; Sc_2 about four times its length distant from tip of *Sc*. Wing-length 5-6 mm.

Hypopygium large and complex, mostly pale but with a blackish spot on each lobe of tergite and another at tip of each coxite; ventral arm of coxite long, bearing a stout black spine laterally near tip; arising from base of fleshy lobe ventrally is another long pubescent arm; rostrum long, the two spines arising from the same point; sternite very small, with fine pubescence only.

Somerset (Shapwick). vii.

L. (D.) halterella Edw. (text-fig. 5, i, j).

A slenderly-built species noteworthy for its very long and thin halteres. Head dark greyish-brown; antennae black, with short verticils. Thorax dull brownish, praescutum darker in middle. Wings clear, iridescent, without stigma. Sc_2 about 4-6 times its length from tip of *Sc*. Wing-length 7 mm.

Hypopygium rather large and with ventral appendage of coxites remarkably complicated; fleshy lobe large; rostrum long and straight, almost separated from the fleshy lobe, with two spines at its middle.

Arran, Morayshire, Perth. ix.

L. (D.) aperta Wahlgren.

Syn. *hyalinata* Zett., ♂ (not ♀).

Blackish brown, with brownish-grey dusting. Flagellar segments shortly oval, with short verticils. Praescutum somewhat darkened in middle. Coxae yellowish. Wings clear, with dark veins and faint stigma. *Sc* short, ending somewhat before base of *Rs*, which is short or very short. Discal cell open in all the numerous British specimens examined (but closed in some of the specimens in Zetterstedt's collection). Wing-length 4-5 mm.

Hypopygium remarkable in having the anal segment largely sclerotised, forming a long rigid tube, otherwise without special modifications. Fleshy lobe large; rostrum moderately long, recurved, with two rather short spines near its base.

Found sitting in flowers of *Parnassia*. Morayshire (Forres), Yorks (Austwick, Ingleton). viii-ix.

Zetterstedt's series of *hyalinata* included two species; the males and the smaller females are *aperta*, the larger females another species for which the name *hyalinata* should be reserved.

L. (D.) rufiventris Strobl. (text-fig. 6, c).

Head black, dusted with silvery-grey, more conspicuously so on frons, which is not quite as wide as in *morio*. Antennae all black. Thorax black, praescutum shining, but most of scutum and pleurae and all of scutellum and postnotum with silvery-grey dusting. Abdomen almost entirely light reddish. Legs light brownish. Wings almost clear, without distinct stigma. Wing-length 5-7 mm.

Hypopygium: Tergite without well-marked processes; fleshy lobe small; rostrum long and stout, with one rather long and stout pale spine or spine-like process.

Argyll (Taynuilt), Inverness (Aviemore, Nethy Bridge). viii.

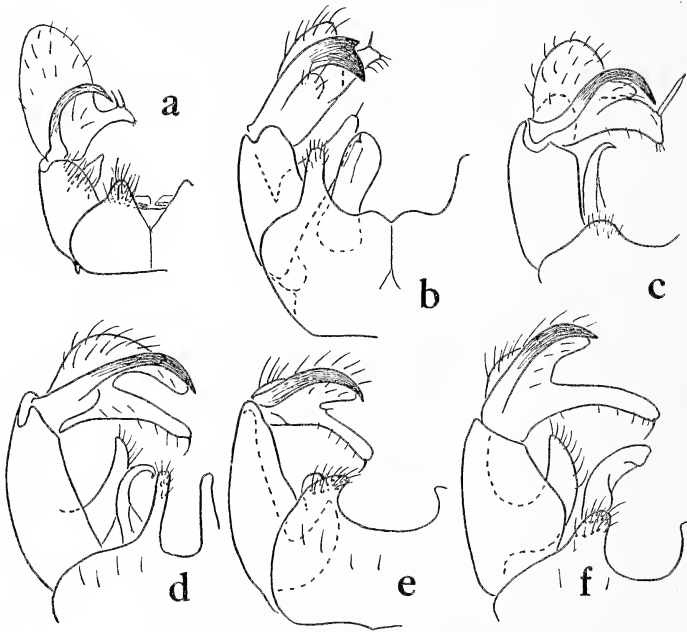


FIG. 6.

Hypopygia of *Dicranomyia* from above: a, *distendens*; b, *occidua*; c, *rufiventris*; d, *stylifera*; e, *morio*; f, *caledonica*. (a to a rather smaller scale than the rest.)

L. (D.) morio F. (text-fig. 6, e).

Syn. *leucocephala* Schum., *angustipennis* Zett.

Head black, frons rather broad and clothed with conspicuous silvery-white microscopic pubescence. Antennae all black,

flagellar segments oval, with short verticils. Thorax brightly shining black; pronotum, a small area in middle of scutum and scutellum, and most of pleurae (except pteropleura and lower part of sternopleura) clothed with fine silvery-grey pubescence. Abdomen black, posterior margins of sternites more or less yellowish. Legs with all coxae yellow, at least apically; front femora blackish except at base; middle and hind femora dark at tips. Wings nearly clear, with small distinct stigma. *Rs* rather short, from one-half to two-thirds as long as R_{2+3} . Wing-length 5-6 mm.

Hypopygium: Tergite large, with a pair of thumb-like processes which are stout, widely separated but somewhat curved inwards; dorsal style normal, simple; ventral style without conspicuous fleshy lobe, rostrum without spines; ventral lobe of coxite small; sternite fairly large and hairy; parameres very short; penis clubbed, with long dense pubescence (a notable peculiarity of the species of this group).

Rather common in marshy places. Surrey and Cornwall to Ross. iv-v, viii-ix.

L. (D.) caledonica Edw. (text-fig. 6, f).

Differs from *morio* as follows: Pteropleura grey-dusted. Abdomen entirely black. Coxae black, hind pair sometimes more brownish. Wings with stigma less distinct.

Hypopygium: Processes of tergite not so far apart; ventral lobe of coxite larger; rostrum longer; parameres much longer and blunt; penis square-ended, with short pubescence.

Bogs with rushes. Inverness, Perth, Sutherland. vi.

L. (D.) stylifera Lack. (text-fig. 6, d).

Closely resembles *caledonica*; no external differences apparent.

Hypopygium: Processes of tergite very long, finger-like, and rather close together; parameres more pointed; ventral lobe of coxite more slender; otherwise resembling *caledonica*.

Marshy places. Perthshire (Killin, White Bridge). vi.

L. (D.) occidua Edw. (text-fig. 6, b).

Differs from *morio* as follows: Antennae with terminal segments somewhat longer. Thorax with silvery-grey dusting on pleurae more extensive, including pteropleurae. Abdomen with sternites mainly yellowish, often also posterior margins of tergites. Front femora not so dark. Wings with a brownish tinge, but stigma less distinct; *Rs* longer, almost or quite as long as R_{2+3} .

Hypopygium: Processes of tergite very wide apart, longer and straight; dorsal style broad, bilobed at tip; ventral style larger; ventral lobe of coxite long and pointed.

Bogs with rushes. Hereford, Perth, Sutherland, Yorks. vi-vii.

Subgenus **GERANOMYIA** Hal.

(Pl. III, fig. 2.)

Differs from *Dicranomyia* only in the elongate mouth-parts; in the British species the rostrum and labium combined are fully as long as the head and thorax together and the palpi are rudimentary. Among exotic species various degrees of elongation of labium and reduction of palpi are found, so that the distinction from *Dicranomyia* is not very sharp, and *Geranomyia* can be regarded as at most a subgenus. Wings and hypopygium as in typical *Dicranomyia*.

L. (G.) unicolor Hal. (Pl. III, fig. 2.)

Syn. *maculipennis* Curt.

Thorax variable in colour; in some specimens almost entirely light brown, in others blackish-brown with yellowish shoulders, but never distinctly striped; sternopleural hairs dark. Legs uniformly light or dark brown. Wings slightly greyish, with three dark grey spots on anterior border (at middle and tip of *Sc* and at stigma), these spots varying in size and distinctness. Two cross-veins between *Sc* and *R*₁ at centres of the dark spots. *Sc* reaching only slightly beyond base of *Rs*. Wing-length 7-9 mm.

Hypopygium extremely similar to that of *L. (D.) fusca* Mg.: fleshy lobe large; rostrum short, recurved, the two strong straight spines on a large tubercle near its base.

Rocky coasts. Argyll, Bute, Devon, Donegal, Dorset, Hants, N. Wales, Wigtown. vi-viii.

* **L. (G.) bezzii** Alex. ?

A single ♀ in the British Museum from Chesil Beach, Portland (*Dr. F. H. Haines*) seems to represent a species distinct from *unicolor*, from which it differs as follows: Size smaller; general colour yellowish. Praescutum with indications of three dark stripes, the middle one faintly divided. Sternopleural hairs yellow. Legs relatively short, pale yellowish, tips of femora rather distinctly darkened. Wings with the markings very faint; spot in middle of *Sc* scarcely distinguishable.

In the absence of the male this specimen cannot be determined satisfactorily; if not an abnormal *unicolor* it may be *G. bezzii* Alex. or an undescribed species.

Subgenus **RHIPIDIA** Mg.

Syn. *Monorhipidia* Alex.

(Pl. III, figs. 3 and 4.)

Differs from *Dicranomyia* chiefly in the pectinate antennae of the ♂; the pectinations may be longer or shorter and in one or two rows according to the species, and in many tropical species which are otherwise very similar to *maculata* there are no definite pectinations, the antennal segments being merely slightly enlarged beneath. The three types of antenna have been regarded as representing three different subgenera (*Rhipidia*, *Monorhipidia*, *Arhipidia*), but it is certainly better to treat the whole group as forming a single subgenus of *Limonia*, as has recently been done by Alexander. Wings as in *Dicranomyia*; *Sc* variable in length, sometimes extending beyond middle of *Rs*. Hypopygium as in *Dicranomyia* except that the 'rostrum' usually bears more than two spines. Humeral pits slightly larger than in most *Limonia*, but still quite small and round. Pteropleura in all three British species with a few short hairs.

L. (R.) maculata Mg. (Pl. III, fig. 3.)

Antennae of ♂ bipectinate, segments 4-11 each having two processes beneath at base; on 5-10 these processes are both long, the outer as long as or slightly longer than the inner; 11 has the outer processes reduced, and 12 has a single short process. Flagellar segments in both sexes with bare necks, longer in ♂ than in ♀. Antennae in ♀ simple, not pectinate.

Thorax greyish-brown, praescutum with a broad dark brown median stripe; pleurae without distinct markings. Front femora with tip blackish, middle and hind femora with dark pre-apical ring. Wings with small grey spots in the cells (more numerous in some specimens than in others) and with larger and slightly darker spots and clouds at middle of *Sc*, at each end of *Rs*, stigma, tip of *2a* and cross-veins. *Sc* rather variable in length, in some specimens ending almost opposite base of *Rs*, in others reaching almost to middle of *Rs*. Two cross-veins between *Sc* and *R* (near middle and just before tip). Wing-length 6.9 mm.; ♀ somewhat larger than ♂.

Hypopygium: Rostrum with a clump of five rather long and slender curved pale spines.

Common. v-ix.

A female from Cambridge has unusually broad wings with reduced markings.

L. (R.) ctenophora Lw. (Pl. III, fig. 4.)

Antennae of ♂ bipectinate, resembling those of *maculata*, but outer pectinations shorter than inner; segments 11 and 12

with a single process which is longer than in *maculata*; 13 also somewhat produced beneath. Antennae of ♀ unipectinate, processes quite long on 4-11, present also on 12 and 13.

Thorax and legs as in *maculata*. Wings without any small spots in the cells; four light brownish spots along costa, at middle and end of *Sc*, base of *Rs* and stigma; cross-veins and outer end of *Rs* also clouded. Two cross-veins between *Sc* and *R* as in *maculata*. *Sc* reaching slightly beyond middle of *Rs*. Wing-length 6.9 mm.

Hypopygium: Rostrum with three longish and fairly stout spines.

About rotten logs. Cambs., Hants, Herts. vi-vii.

L. (R.) *uniseriata* Schin.

Antennae of ♂ unipectinate, each of segments 4-12 bearing a single mid-ventral process at base, those on 4, 11 and 12 very short. Antennae of ♀ without definite pectinations, segments 4-10 somewhat produced beneath.

Thorax as in *maculata*. Front femora much more extensively black than in the other two species. Wings as in *ctenophora* except that the spot at middle of *Sc* and the cross-vein at the centre of this spot are lacking.

Hypopygium: Resembles that of *maculata*, but the five rostral spines shorter and darker.

Around rotten logs. Hants, Herts, Hunts (Kimbolton). iv-vii.

TAPHROPHILA Rond.

Syn. *Antocha* O.-S.

(Pl. I, fig. 18.)

This genus is very readily distinguished by the combination of two characters of venation, *Sc* running practically in contact with *R*₁ for the whole of its length, and *Rs* long, quite straight and somewhat divergent from *R*₁. The radial cross-vein is usually said to be present, but in the European species is very faint and sometimes definitely absent (thus there is no discrepancy between Rondani's diagnosis of his genus *Taphrophila* and the characters of *A. vitripennis*). A further peculiarity is the unusual shortness of the first abdominal tergite, which bears a conspicuous fringe of hair. As in *Limonia* the claws are toothed, empodium rudimentary, and ninth abdominal sternite of ♂ small and free, but the penis has only a single terminal opening.

The genotype of *Taphrophila* was given by Rondani as *inusta* Mg., but this was an obvious misidentification. Osten-Sacken (1887) reported having seen a specimen of *vitripennis* Mg. in Bigot's collection labelled *Taphrophila inusta* by Rondani, hence there can be no doubt that *Taphrophila* is the same

as *Antocha*, and as it has priority it is adopted here. The name *Taphrophila* ('foam-loving') is particularly appropriate to the species of this genus.

T. vitripennis Mg. (Pl. I, fig. 18.)

Easily recognised by venation and by the somewhat milky appearance of the wings (not seen in any other British Limoniine except *Orimarga*). Thorax rather variable in colour; ground-colour light reddish to rather dark grey; praescutum with or without a brown central stripe and indistinct lateral stripes. Abdomen blackish. Legs brownish. Wing-length 6-8 mm.

Common by running water. Argyll, Carnarvon, Cheshire, Glos., Herts, Middlesex, Perth, Sutherland, Westmorland, Yorks. vi-viii.

This was formerly but apparently mistakenly identified with the North American *opalizans* O.-S. The variation in colour is not (as it is in the case of the American forms *opalizans* and *saxicola*) accompanied by any structural difference in the hypopygium, the different forms found here evidently belonging to one variable species.

THAUMASTOPTERA Mik.

(Pl. I, fig. 17.)

This might be confused with *Orimarga* owing to the retracted position of *m-cu*, but apart from differences in other wing-veins (*Rs* shorter and more curved; upper instead of lower branch of *M* forked), it may be distinguished by having the praescutum distinctly produced over the pronotum and the empodia rudimentary. In the ♂ hypopygium the chief peculiarity is that the coxite bears only a single style (or the styles may be regarded as fused).

T. calceata Mik. (Pl. I, fig. 17.)

Pale yellow, including appendages; tips of femora (especially front pair) and tibiae narrowly black. Veins pale, base of *Rs* and cross-veins blackish. Wing-length 5-6 mm.

Boggy springs; local. Devon, Hants, Herts, Oxon., Yorks. vi-vii.

ORIMARCA O.-S.

(Pl. I, fig. 16; text-fig. 7.)

A well-marked genus distinguished from most other genera of craneflies by the position of *m-cu* very far before the fork of *M*; another obvious distinction from other genera of Limoniini is that the discal cell is always open and confluent with the

second posterior (*i.e.* the lower instead of the upper branch of *M* is forked). Thorax rather long but not produced over head; humeral pits absent. Claws with small basal tooth or simple; empodium quite large (a unique feature in this tribe). Hypopygium without separate sternite; two pairs of styles, the outer one a bare pointed hook as in *Antocha*.

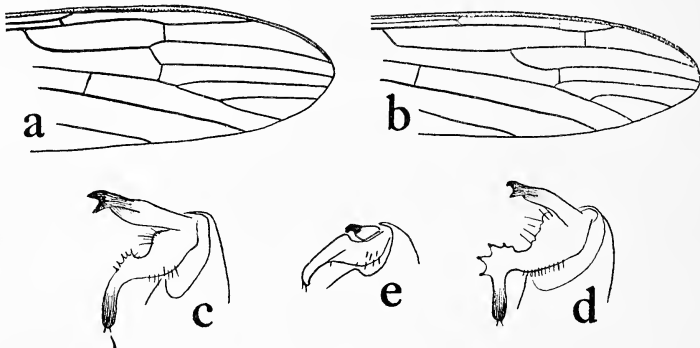


FIG. 7.

a, b, venation of *Orimarga*: a, *virgo*; b, *attenuata*.
c-e, styles of *Helius*: c, *longirostris*; d, *flavus*; e, *pallirostris*.

O. virgo Zett. (Text-fig. 7, e.)

Thorax with light reddish-brown ground-colour, dusted with grey. Legs very pale, tips of femora darkened. Wings faintly whitish by transmitted light, veins pale. Venation: tip of R_1 twice to four times as long as r ; $r-m$ only about its own length distant from fork of R_s and before the first fork of M . Wing-length 7-8.5 mm.

Hypopygium: Penis rather small, not compressed.

Devon, Dorset, Sutherland, Yorks. vi-viii.

O. attenuata Walk. (Pl. I, fig. 16; text-fig. 7, b.)

Syn. *alpina* Zett., ? *juvenilis* Zett.

Thorax black, grey-dusted. Legs mainly blackish. Wings narrower than in *virgo*, veins not so pale. Venation: tip of R_1 less than twice as long as r ; $r-m$ several times its length beyond fork of R_s and at or beyond first fork of M . Wing-length 6-7 mm.

Hypopygium: Penis large, laterally compressed, so that in the dry specimen the hypopygium appears enlarged at base beneath.

Devon (Scaton, Dale), Moray, Perth, Sutherland, Yorks. vi-vii.

ELLIPTERA Egg.

(Pl. I, fig. 19.)

A rather isolated genus recognised by the peculiar venation, the very long *Rs* running close to and parallel with *R*₁ being unlike the condition of this vein in any other Limoniine genus; the absence of cross-vein *r* and the confluence of the discal with the third posterior cell give it a certain degree of resemblance to *Gonomyia*, sub. *Ellipteroides*. As in most other Limoniini the thorax lacks humeral and anterior pits. Claws simple, empodium rudimentary. Abdomen of ♂ with the eighth sternite modified.

* **E. omissa** Egg.

A blackish insect superficially resembling a *Dicranomyia* (e.g. *sericata*) or *Dicranota*, but easily distinguished by the peculiar venation. Antennal segments moniliform. Mesonotum somewhat shining, unstriped. Wings clear, without stigma, veins dark. Wing-length 6.5-7.5 mm.

This genus and species has not hitherto been recorded as British, and no adult specimen has been taken in this country, but in June, 1924, I took two pupal skins at Pateley Bridge, Yorks, which on account of the remarkably large ear-shaped respiratory horns were almost certainly *E. omissa*; they were found sticking out of a rotten log which was partly submerged in a small waterfall.

HELIUS St. Farg.Syn. *Rhamphidia* Mg.

(Pl. I, fig. 20; text-fig. 7.)

This genus is readily distinguished from all other British members of the subfamily by having the rostrum longer than the head, with the maxillary palpi at its tip. Though placed in the tribe Limoniini on account of the absence of tibial spurs and the three-branched radius, it does not seem at all closely related to any of the other included genera. In some features (presence of distinct humeral pits; complete ring of ninth abdominal segment of ♂; wavy base of radius, without any sign of a break below humeral cross-vein), it shows affinity with Hexatomini rather than with Limoniini.

The species occur in weedy ponds and bogs.

H. longirostris Mg. (Text-fig. 7, c.)Syn. ? *dubius* Edw.

Head dark grey; antennae and proboscis all black; first few flagellar segments not much longer than broad. Thorax brownish (sometimes reddish-tinged on pleurae); praescutum with three

ill-defined dark brown stripes, the middle one running the whole length. Abdomen mainly dark. Wings with stigma elongate, light greyish; length 7-9 mm.

Hypopygium: Tergite with deep V-shaped emargination, without processes; outer style moderately long, the blackened tip bifid; inner style bent inwards, distal portion dark and bare, a few small spines at the bend.

Arran, Hants, Herts, Kent, Middlesex, Yorks. vi-vii.

In spite of some discrepancies with the original description (notably Meigen's statement that the head is pale yellow), Lackschewitz was of the opinion that this species is the true *longirostris* Mg. The specimen in the Paris Museum has lost its head but might well be this species.

H. flavus Walk. (Text-fig. 7, d.)

Head dark grey; proboscis all black; antennae with second segment often more or less pale. Thorax mainly or entirely yellowish-brown, praescutum sometimes with a dark area in middle in front. Abdomen mainly pale. Wings without stigma; length 7-9 mm.

Hypopygium: Differs from *longirostris* in shape of inner style, which has a much larger hump at the bend, with more conspicuous teeth (specimens from several localities compared).

Cambs, Carnarvon, Hants, Herts, Middlesex, Yorks. vi-vii.

H. pallirostris Edw. (Pl. I, fig 20; text-fig. 7, e.)

Head greyish-brown, darker in middle; proboscis light brown beneath, darker above; antennae all black, basal flagellar segments about twice as long as broad. Thorax light brownish, praescutum with three distinct blackish stripes. Wings with the stigma shortly oval, dark brown, quite conspicuous; length 9-11 mm.

Hypopygium: Tergite with a pair of small rounded projections in middle; outer style very short, tip not bifid; inner style without spines or teeth.

Devon, Hereford, Herts, Somerset. v-vi.

PEDICINI.

The principal characters of this tribe are the pubescent eyes (found in no other Tipulidae, though occurring also in Trichoceridae) and the position of the subcostal cross-vein very far back from the tip of *Sc*, almost always before the base of *Rs* (the only exceptions to this being in individual specimens of *P. rivos*a, where the cross-vein may be slightly beyond the base of *Rs*). The tibiae are always spurred and the radius four-branched (apart from the cross-vein in the marginal cell, which is most probably to be reckoned as *R*₂), as in Hexatomini. On the other

hand, there is never any trace of anterior or humeral pits on the praescutum, such as are found in most Hexatomini. The species of *Pedicia* (sens. lat.) and *Dicranota* (sens. lat.) have in common another peculiarity of venation which has not been noted hitherto: the origin of the posterior cubitus is placed well beyond the cross-vein which connects the two anal veins near the base of the wing, instead of being more or less in a line with it as in most other Tipulidae. This peculiarity is not shared by the genus *Ula*, although it is seen again in *Gonomyia*.

Many members of this tribe may often be recognised in life by this rather peculiar gait in walking, which might be described as a jerky run. 'Swarming' of the males seems seldom to occur in members of this tribe, in contrast with the other three tribes, where the habit is almost universal.

KEY TO BRITISH GENERA AND SUBGENERA OF PEDICIINI.

1. Wing-membrane hairy *Ula* Hal.
Wing-membrane bare 2.
2. Second submarginal cell with base pointed and nearly always distal to that of first posterior; antennae 15-17 segmented (*Pedicia* sens. lat.) 3.
Second submarginal cell with base square and level with that of first posterior; *Rs* short; antennae 13-segmented (*Dicranota* sens. lat.) 6.
3. Cord oblique; large species with striped wings (Pl. I, figs. 1, 2) *Pedicia* s.str.
Cord not noticeably oblique; smaller species, wings not striped 4.
4. Fourth (penultimate) posterior cell sessile (i.e. with its base level with that of the open discal cell) (Pl. I, fig. 3) *Amalopsis* Hal.
Fourth posterior cell stalked (i.e. its base much beyond base of discal cell, or of third posterior cell if discal cell is open) 5.
5. Second posterior cell about equal in length to its stem (which includes upper margin of discal cell when latter is closed) (Pl. I, figs. 4 and 5) *Crunobia* Kol.
Second posterior cell shorter (usually much shorter) than its stem (Pl. I, fig. 6) *Tricyphona* Zett.
6. Two cross-veins in marginal cell (Pl. I, figs. 7 and 8) 7.
Only one cross-vein in marginal cell *Rhaphidolabis* O.-S.
7. Antennae of ♂ somewhat elongate (stigma dark) *Dicranota* s.str.
Antennae short in both sexes (stigma faint) *Paradicranota* Alex.

The genus or subgenus *Nasiterna* may also occur in Britain. *N. varinervis* Zett. (mistakenly recorded as British by Bradley) superficially resembles an *Elaeophila* on account of the spotted wings and presence of a cross-vein in lower basal cell. It is allied to *Tricyphona*.

PEDICIA Latr.

It was long ago pointed out by Osten-Sacken that the characters distinguishing *Pedicia* and *Amalopsis* are unimportant and for the most part superficial, and that *Amalopsis* might well

have been included in *Pedicia*. Recent discoveries of new species of the group in Japan and Eastern Asia have shown that in that region the two genera merge completely, and Alexander has therefore placed *Tricyphona* (*Amalopsis*) as a subgenus of *Pedicia*. This is probably justified, but among British species of the group it is possible to distinguish fairly clearly four subgenera instead of two, *Crunobia* and *Amalopsis* being about as distinct from one another and from *Tricyphona* as they are from *Pedicia*. With this modification Alexander's view is adopted here.

Pedicia as a whole differs from *Dicranota* in the two characters mentioned in the key; no other constant distinctions are apparent. The number of antennal segments appears to be normally 16 (rather than 15, as suggested by Osten-Sacken) but some species certainly have 17 and others 15. In contrast with *Dicranota* the discal cell is very often closed, and a second cross-vein (*r*) in the marginal cell is not normally present, though occasionally seen in aberrant examples of *P. immaculata*.

In several species of this genus, particularly in the subgenera *Crunobia* and *Tricyphona*, abnormalities of venation are extraordinarily frequent. Examples of this variability are illustrated for *P. claripennis* and *immaculata*, and similar series could probably be obtained in the case of other species, e.g. *straminea* or *littoralis*. The venation in the subgenus *Pedicia*, however, seems to be more constant.

All the species are found in mossy bogs and springs.

The hypopygium shows some distinctive features. In all species of the genus the coxite bears a hairy dorsal apical lobe somewhat like that of the genus *Gonomyia*; beneath this is a double structure, which may represent the two styles, as I have assumed here, or one portion may be the style and the other (spinulose) portion merely a ventral apical lobe of the coxite; these structures are separated from one another and from the coxite to varying degrees in the different subgenera.

Subgenus **PEDICIA** Latr. s. str.

(Pl. I, figs. 1 and 2.)

The distinctive characters of the subgenus are: (1) Type of wing-markings, with dark stripes along costa, *Cu* and 'cord.' (2) Cross-vein *r-m* and *m-cu* and base of discal cell forming a straight and very oblique line. (3) Palpi, especially the last segment, considerably longer than in the other subgenera. (4) In the hypopygium, the dorsal style is of peculiar form, with a long, bare, outer arm (the densely spinulose ventral style is intimately connected with the coxite as in the other subgenera).

The forks of the media (second and fourth posterior cells) are as in *Tricyphona* s.str.

P. (P.) rivosa L. (Pl. I, figs. 1 and 2.)

The largest British Limoniid, easily distinguished from all others by the conspicuous wing-pattern. Wing-length 18-24 mm., ♀ tending to have shorter wings than ♂.

Local. Kent and Devon to Sutherland. vi-viii.

In most southern specimens (Pl. I, fig. 1) the broad streak along *Cu* is continued only narrowly or faintly along the distal part of the vein, the extreme tip of which has a dark dot. In most northern specimens, on the other hand (Pl. I, fig. 2), this streak is continued equally broadly to the wing-margin. Some ♀♀ have the wings shorter than the abdomen and narrower than in the ♂♂.

Subgenus **CRUNOBIA** Kol.

(Pl. I, figs. 4 and 5.)

Although this has never been generally adopted as a genus or subgenus, the genotype (*schineri* Kol. = *straminea* Mg.) has several distinctive characters, which it shares with *littoralis* Mg. These are: (1) The shape of the thorax, which differs from both *Tricyphona* and *Amalopsis* in having the postnotum extended backwards, appearing almost flat in side view; the hind and middle coxae are also extended backwards, almost in a line parallel with the direction of the postnotum. (2) The venation is somewhat intermediate between *Tricyphona* and *Amalopsis*; second posterior cell deep and narrow, about equal in length to its stem when discal cell is open, almost or quite sessile on the discal cell when the latter is closed; fourth or penultimate posterior cell stalked (*i.e.* with its base well beyond base of discal cell, or of third posterior cell when discal cell is open), though the stalk is shorter than is usually the case in *Tricyphona*. (3) The hypopygium resembles that of *Pedicia* in having a median but no lateral projections on the tergite; the small modified dorsal style bears a few black thorns, the small spinulose ventral style being partly fused at its base both with the dorsal style and with the coxite.

P. (C.) littoralis Mg. (Pl. I, fig. 4.)

Head dark brownish, grey-dusted. Antennae almost entirely yellowish, flagellum considerably swollen towards base. Palpi black. Thorax uniformly brownish-yellow, dull. Abdomen brownish-yellow, last few segments and hypopygium darker. Legs rather stout, brownish-yellow, femora in some specimens indefinitely darker. Wings with slight grey tinge, costal cell darker, small dark brown clouds at base of *Rs* and over *r-m*, also (less obviously) over *r* and base of *R*₂. Wing-length 12-16 mm.

Hypopygium: Middle projection of tergite somewhat truncate; dorsal style with two black thorns.

Local. Britain to Inverness (except S. E. England?), Ireland. v-vi.

P. (C.) straminea Mg. (Pl. I, fig. 5.)

Syn. *schineri* Kol., *geniculata* Mcq.

Almost wholly pale yellowish, including head, antennae and legs; palpi somewhat darkened; tips of femora, tibiae and tarsi rather narrowly but conspicuously blackish. Wings almost clear, *r-m* and base of *Rs* sometimes faintly clouded. Wing-length 9-11 mm.

Hypopygium: Middle projection of tergite pointed, dorsal style with about six black thorns.

Arran, Devon, Flint, Hereford, Kincardine, Morayshire, Yorks. vi-vii, ix-x.

Subgenus **AMALOPIS** Hal.

Syn. *Olecranopelma* End.

(Pl. I, fig. 3.)

The genotype (*occulta* Mg.) differs from all the other British species of the tribe in the sessile penultimate posterior cell, and on this account seems to deserve subgeneric separation from *Tricyphona*. Thorax of the normal shape, with arched post-notum; posterior coxae directed downwards rather than backwards. Hypopygium with the tergite simple, without lateral or median processes; coxite resembling that of *Crunobia*, but style without black thorns.

P. (A.) occulta Mg. (Pl. I, fig. 3.)

Syn. *transversa* Mg. of Stephens and Enderlein,
not of Meigen.

Head dark greyish, with a brown patch above; antennae normally 16-segmented, scape yellowish (at least second segment), flagellum blackish. Thorax blackish, heavily dusted with grey except on three rather shining praescutal stripes, middle stripe divided by a narrow pale line. Abdomen light reddish, tergites largely dark or with a dark central stripe. Legs with coxae and most of femora reddish, otherwise largely blackish-brown. Wings with brown spots at base of *Rs* and tip of *R*₁ and a conspicuous brown seam over cord, sometimes also with small clouds at tip of *R*₂ and base of cell *M*₁. Wing-length 11-15 mm.

Brecon, Carnarvon, Cheshire, Devon, Hereford, Kincardine, Perth, Westmorland, Yorks. iv-x.

An abnormal specimen in the Stephens collection in the British Museum (mentioned by Verrall as probably a distinct species) has antennae only 13-segmented (the first six flagellar segments being fused in pairs) and lacks *m-cu* on one wing.

Subgenus **TRICYPHONA** Zett.

Syn. *Bophrosia* Rond.

(Pl. I, fig. 6.)

In the restricted sense understood here, this subgenus includes small and medium-sized species which in some respects resemble *Dicranota* more than they do *Pedicia* or *Crunobia*. Thorax normal, with arched postnotum; posterior coxae directed downwards. Wings with second posterior cell long-stalked, usually much shorter than its stem when discal cell is open and with fairly long stem even when discal cell is closed; fourth posterior cell also long-stalked. Hypopygium (in all five British species) resembling that of *Dicranota* (subgenus *Paradicranota*) in having a long, bare process from each side of the tergite, resembling a paramere; the spinulose ventral style separated from the coxite.

Of the five British species the first two are lighter in colour, with a rather bright orange-yellow hypopygium in which the coxite has an apical dorsal lobe and the two styles are separate; the remaining three are blackish, with a black hypopygium in which the coxite has no definite apical dorsal lobe and the two styles are fused (the spinose portion evidently representing the ventral style).

P. (T.) lucidipennis Edw. (Pl. I, fig. 6; text-fig. 8, b.)

Head dark greyish. Antennae rather slender, almost as long as thorax, 16-17 segmented, blackish, second segment lighter. Thorax grey, praescutum as seen from in front with four slightly shining blackish stripes, the middle pair close together; as seen from above or behind the stripes appear dull and the middle pair completely fused; scutellum more or less pale. Abdomen dark, venter and hypopygium more reddish-yellow. Legs light brownish, coxae all yellowish. Wings almost clear, rather broad, anal angle well-marked; hair on veins on distal half quite obvious; first section of R_2 almost twice as long as second. Wing-length 10-12 mm.

Hypopygium: Tergite forming a narrow strip, with a long recurved bare process on each side, corners scarcely produced; coxite with a dorsal apical lobe bearing spinules.

Carnarvon (Penmaenmawr), Elgin (Grantown), Inverness (Lairig Ghru, Aviemore), Kerry (Killarney). v-viii.

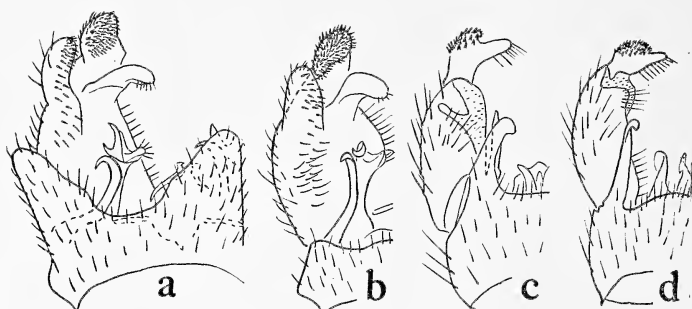


FIG. 8.

Hypopygia of *Tricyphona* from above: a, *claripennis*; b, *lucidipennis*; c, *schummeli*; d, *unicolor*.

P. (T.) claripennis Verr. (Text-fig. 8, a; 9.)

Very like *lucidipennis*, but middle pair of praescutal stripes appearing separate, at least posteriorly, from all points of view; wings narrower, with anal angle more obtuse; hair on veins on distal part of wing extremely short; first section of R_2 less than twice as long as second. Antennae distinctly 17-segmented in all specimens in which the segments are counted. Wing-length 6.5-9.5 mm.

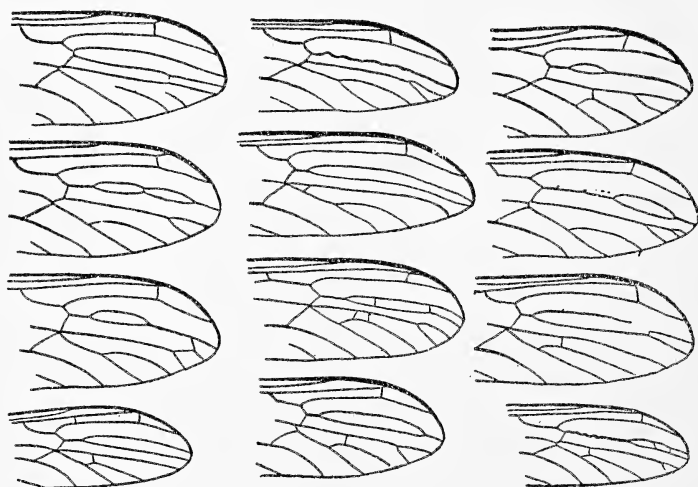


FIG. 9.

P. (Tricyphona) claripennis Verr. Abnormalities of venation in specimens from Perthshire and Inverness (after Edwards, Scot. Nat., 1932-3).

Hypopygium: Similar to *lucidipennis*, but tergite larger, with greatly produced corners.

Anglesey, Carnarvon, Devon, Dumbarton, Inverness, Merioneth, Perth, Ross, Stirling, Sussex, Westmorland, Yorks. v-viii.

In some localities the venation is extremely inconstant (text-fig. 9).

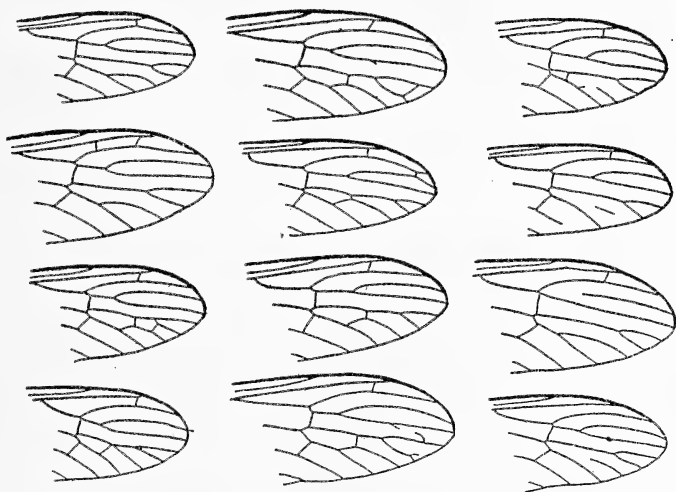


FIG. 10.

P. (Tricyphona) immaculata Mg. Abnormalities of venation in series of specimens from Ben Alder, Inverness (after Edwards, Scot. Nat., 1932). (Top left-hand figure represents normal venation of the species.)

P. (T.) immaculata Mg. (Text-fig. 10.)

Black, including antennae and legs; bases of femora and halteres yellow; base of wing whitish yellow. Antennae only about half as long as thorax, basal part of flagellum much swollen, distal part slender; 15 segments usually distinguishable. Body somewhat grey-dusted. Praescutum with three indistinctly darker stripes, middle stripe undivided. Wings quite clear; second submarginal cell with a rather long stalk; *Rs* usually gently curved; *r-m* at or very slightly beyond base of *Rs*; discal cell usually open. Wing-length 5.9-5 mm.

Hypopygium: Lateral process of tergite almost straight; coxite without dorsal apical lobe; style with few spines on outer portion, inner portion scarcely prominent; parameres curved downwards, tips narrow.

Very common throughout the British Isles. v-vi, ix-xi.

The venation is in some localities very inconstant.

P. (T.) unicolor Schum. (Text-fig. 8, d.)

Very similar to *immaculata*, but middle praescutal stripe indistinctly divided by a pale line; femora almost uniformly dark brownish rather than black, coxae sometimes lighter. Venation similar, but *Rs* considerably longer and *r-m* definitely beyond fork of *Rs*; discal cell often closed. Wing-length 7-8 mm.

Hypopygium: Lateral process of tergite recurved at tip; style with very numerous spinules on outer portion, inner portion beak-like; parameres curved downwards, tips flattened.

Carnarvon (Bangor), Hants (New Forest), Inverness (Aviemore), Perth (Glen Lyon), Yorks (Rawdon). vi.

The New Forest specimens are much lighter, with reddish legs and genitalia.

P. (T.) schummeli Edw. (Text-fig. 8, c.)

Similar to *immaculata* and *unicolor* but differing from both in having antennae less short, 16-segmented, flagellum less swollen towards base; also in venation, the second submarginal cell being very shortly stalked. Thorax more grey-dusted; praescutum when seen from in front with four distinct shining black stripes. Coxae as well as bases of femora brownish rather than black. Wing-length 5.5-7 mm.

Hypopygium: Lateral process of tergite stout; inner portion of style more produced than in *unicolor*; parameres straight.

Aberdeen, Arran, Bucks, Carnarvon, Inverness, Lancs, Salop, Sussex, Yorks. vi-vii.

DICRANOTA Zett., s. lat.

(Pl. I, figs. 7 and 8.)

The European species of this genus are all small or of medium size, with little or no ornamentation and with 13-segmented antennae; *Rs* is very short, strongly curved if not bent or spurred, and the discal cell (except in abnormal specimens) open. This definition will not apply in its entirety to all exotic species, but apparently all have the second submarginal cell square at the base, this being the most constant distinction from *Pedicia* sens. lat. Formerly *Dicranota* was defined by the presence of two cross-veins in the marginal cell instead of one, but now that *Rhapidolabis* is included (certainly correctly) as a subgenus, this feature cannot be reckoned among the generic characters.

Most of the species are found on rocks and stones in rapid streams, some by weedy streams or springs.

Abnormalities of venation are very frequent, but not usually so striking as in some species of *Pedicia*.

The hypopygium is of similar type to that of *Pedicia*, but the ventral style is almost or quite separate from the dorsal (or inner) style and appears as a ventral apical lobe of the coxite.

Subgenus **DICRANOTA** Zett., s. str.

(Pl. I, fig. 8.)

Antennae in ♂ longer than head and thorax together, rather stout, segments elongate-oval; in ♀ much shorter. Wings with the stigma more distinct than in *Paradicranota* and *Rhaphidolabis*. Hypopygium with the ventral style without definite spinules even at tip.

D. (D.) bimaculata Schum. (Pl. I, fig. 8.)

Syn. *finitima* Walk., *secretata* Walk., ? *stigmatella* Zett.,
demissa Hal.

Wings with distinct dark stigma; a very small dark cloud over *r-m*, but none over *m-cu* or base of *Rs*. Cell M_1 short but apparently always present. Wing-length 8-10 mm.

Hypopygium: Ventral style shortly oval, hairy, much shorter than the curved dorsal style.

Beds, Berks, Bucks, Carnarvon, Denbigh, Herts, Inverness, Montgomery, Salop, Suffolk, Yorks. iv-v, vii.

D. (D.) guerini Zett. (Text-fig. 11, a.)

Wings with stigma still more distinct than in *bimaculata*; cloud over *r-m* larger; small clouds or dark seams often present over *m-cu* and base of *Rs*; cell M_1 as often absent as present. Wing-length 6-9.5 mm.

Hypopygium: Ventral style elongate, finger-like, with only a few short hairs, equal in length to dorsal style, which is nearly straight.

Inverness, Perth, Ross, Yorks. vi, viii, x.

Two very small females in the British Museum from Loch Etchachan (*Coe*) perhaps represent a third species of this subgenus; they have the pale line dividing the median praescutal stripe broader and more distinct than in other specimens of *guerini* or *bimaculata*; no cloud at base of *Rs*; wing-length barely 5 mm. In one of these specimens cell M_3 is absent as well as cell M_1 .

Subgenus **PARADICRANOTA** Alex.

(Pl. I, fig. 7.)

This was proposed as a subgenus for those species of *Dicranota* without cell M_1 , leaving *Dicranota* s. str. to include those species in which this cell is present. The distinction is not applicable to European species, because, in the first place, *D. guerini* may have cell M_1 either present or absent, and secondly because *D. parvida* (without cell M_1) is obviously very closely related to *D. subtilis* (with cell M_1 normally present). The Euro-

pean species of *Dicranota* do, however, fall into two groups to which the names *Dicranota* and *Paradicranota* may perhaps be applied. The three species noted below agree with the genotype of *Paradicranota* (*rivularis* O.-S.) in having the antennae short in both sexes and an indistinct wing-stigma; they all have a hypopygium of a similar type, with a more or less developed lateral process to the tergite, a well-marked dorsal apical lobe to the coxite, and the ventral style bearing strong spinules.

D. (P.) pavida Hal. (Pl. I, fig. 7.)

Distinguished from the other species by the constant absence of cell M_1 . Thorax usually with a slight reddish tinge on postnotum and pleurae. Wing-length 7-8.5 mm.

Hypopygium: Dorsal apical lobe of coxite small; tergite with long, blunt-tipped lateral process; parameres bent at right angles near tip, which is pointed.

Sussex and Devon to Inverness and Kerry. v-vi.

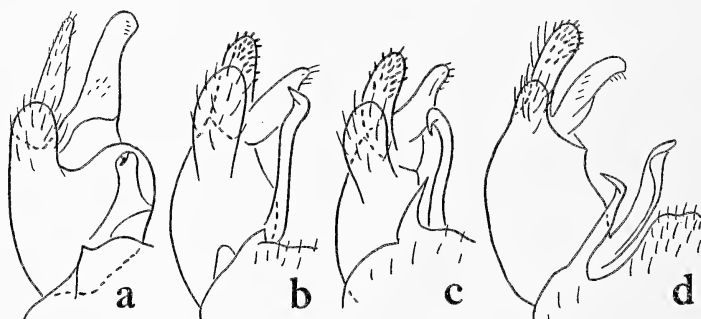


FIG. 11.

Hypopygia of *Dicranota* from above: a, *guerini*; b, *brevitarsis*; c, *subtilis*; d, *exclusa*.

D. (P.) subtilis Lw. (Text-fig. 11, c.)

Cell M_1 present in all specimens examined; thorax with postnotum and pleurae dark greyish, but coxae usually reddish-tinged. Wing-length 5.5-7 mm.

Hypopygium: Lateral process of tergite moderately long, pointed; parameres sinuous, the pointed tip strongly recurved, inner margin with some short hairs.

Cheshire (Adlington), Lanarkshire (Gorge of Avon), Perth (Killin), Salop (Snailbeach), Yorks (Pen-y-Ghent). v-vii.

Determination in accordance with Continental specimens named by Lackschewitz.

The figures given by Lundström as representing the hypopygium of this species actually depict *D. exclusa* Walk.

One British specimen has the discal cell closed (both wings). This is the only example I have seen of a closed discal cell in the genus.

* **D. (P.) brevitarsis** Bergr. (Text-fig. 11, b.)

Very similar to *subtilis*, but perhaps distinguishable by greyer coxae. Cell M_1 present in all specimens examined, but sometimes very short and probably occasionally absent.

Hypopygium: Lateral processes of tergite reduced to small triangular projections; dorsal apical lobe of coxite larger than in the other species; parameres nearly straight, bent at tips, bare as usual.

Durham (Teesdale), Inverness (Feshie Bridge, Glen Einich), Perth (Killin), Sutherland (Inchnadamph), Westmorland (Staveley). vi-vii.

Determination in accordance with Lackschewitz' MS. The tarsi are not shorter than in the other species; first front tarsal segment slightly longer than tibia. This is perhaps the species noted by Cheetham (1929) as *D. longitarsis*.

Subgenus **RHAPHIDOLABIS** O.-S.

The single British species has most of the characters of *Paradicranota* as redefined above, the only obvious difference being the absence of cross-vein *r*. It is clear that these two groups are more closely related to one another than either is to *Dicranota* s. str.

D. (R.) exclusa Walk. (Text-fig. 11, d.)

Syn. *coelebs* Zett.

Very similar to *subtilis* except for the constant lack of cross-vein *r* (the inner of the two cross-veins in the marginal cell). Coxae and hypopygium reddish. Cell M_1 present. Wing-length 5-8 mm.

Hypopygium: Tergite with middle part prominent and hairy; lateral process long, the pointed tip bent outwards.

Arran, Cheshire (Goyt Valley), Denbigh, Inverness, Montgomery, Perth (Blairgowrie, Killin). v-vi.

ULA Hal.

(Pl. I, fig. 9.)

This genus possesses most of the principal characters of the tribe (pubescent eyes, retracted position of Sc_2 , absence of humeral and anterior pits, spurred tibiae) but differs from the other genera and shows a superficial resemblance to *Ormosia* in the uniformly pubescent wing-membrane and absence of cell M_1 . The venation resembles *Gnophomyia* in that *r-m* is placed almost exactly at the fork of *Rs*.

Hypopygium: Tergite and coxite without lobes or processes; style simple, single, with a number of black spinules, thus somewhat resembling the *ventral* style of *Dicranota*.

The single British species breeds in fungi.

U. sylvatica Mg. (Pl. I, fig. 9.)

Syn. *pilosa* Schum., *macroptera* Mcq., *mollissima* Hal.,
vagans Walk., *inconclusa* Walk.

Head dark grey; antennae longer than head and thorax in ♂, somewhat shorter in ♀; scape yellow, flagellum black, with one long hair and fine dense pubescence on each segment. Thorax brownish, praescutum sometimes darker in middle, sometimes wholly dark and grey-dusted; pleurae usually mainly reddish-yellow but variable in tint. Abdomen blackish, hypopygium usually reddish (not dark, as stated by Meigen). Legs brownish. Wings light greyish; a light brown stigma usually distinguishable, sometimes slight brown clouds over cross-veins. Wing-length 6-10 mm.

Common. England, Wales, Scotland, Ireland. v-vi, ix-xi.

I examined Meigen's types in Paris some years ago and found them to be *Ula pilosa*, as suspected by Schummel as long ago as 1829.

HEXATOMINI.

This tribe as now understood includes the Limnophilini and Anisomerini of Osten-Sacken, without however including *Trichocera* and its allies. The near relationship of the Anisomerini with the Limnophilini has been clearly demonstrated by a study of larval morphology, and it is now admitted that the difference in antennal structure between the two groups is not sufficient to warrant their segregation as separate tribes.

The Hexatomini are characterised by the presence of tibial spurs and of two submarginal cells, in conjunction with completely bare eyes; the only British genus of the tribe in which tibial spurs are not readily discernible is *Oxydiscus*. Almost all the species possess five posterior cells (cell M_1 being present), the only exceptions in the British fauna being the two species of *Hexatoma*, *Pilaria meridiana*, and abnormal specimens of *Limnophila nemoralis* and *filata* and *Oxydiscus nielsenii*. Subcostal cross-vein (Sc_2) always placed near or at the tip of Sc ; base of radius bent (not knotted as in Limoniini); praescutum usually with anterior pits near front margin, humeral pits usually conspicuous; microtrichia of wing-membrane usually coarse; ninth tergite and sternite of ♂ forming a more or less complete ring, not much narrowed at sides.

Males of this tribe can often be distinguished when on the wing from those of Limoniini or Eriopterini by their movements

in dancing. The difference is difficult to define, but Hexatomini males seem to swing more from side to side and have their legs more widely outstretched in dancing than males of the other tribes.

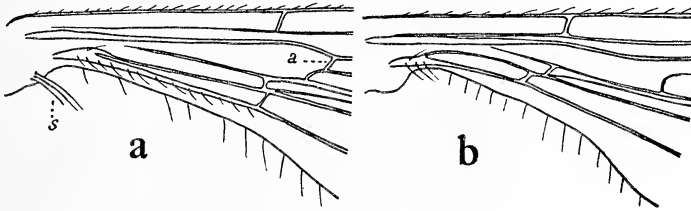


FIG. 12.

Base of wing of Hexatomine genera: a, *Pylaria*, showing arcular cross-vein (a) and squamul hairs (s); b, *Austrolimnophila*, showing absence of those structures.

KEY TO BRITISH GENERA AND SUBGENERA OF HEXATOMINI.

1. Five (rarely four) posterior cells; antennae 16-segmented (*Limnophilini*) 2.
Only three posterior cells; antennae 6—7 segmented (♂) or 9—10 segmented (♀) (*Hexatomini* s.str.) (Pl. III, fig. 14) ... *Hexatoma* Latr.
2. Cross-vein *m-cu* at base of discal cell (pronotum large; arcular cross-vein absent) (Pl. III, figs. 7 and 8) *Dactylobasis* O.-S.
Cross-vein *m-cu*, except in abnormal specimens, well beyond base of discal cell 3.
3. Arcular cross-vein (between *R* and *M* near base of wing) absent (Text-fig. 12, b) 4.
Arcular cross-vein present (Text-fig. 12, a) 5.
4. An accessory cross-vein in costal cell; third antennal segment large and conical (Pl. III, figs. 5 and 6) *Epiphragma* O.-S.
No accessory cross-vein in costal cell; third antennal segment smaller, not conical (Pl. III, fig. 13) *Austrolimnophila* Alex.
5. Wing-membrane hairy at tip; anterior pits of mesonotum removed from front margin; tibial spurs very small, sometimes absent; *r* absent *Oxydiscus* de Meij.
Wing-membrane bare; anterior pits of mesonotum close to front margin, sometimes indistinct (text-fig. 13); tibial spurs always obvious; *r* present (*Limnophila* sens. lat.) 6.
6. Tip of vein *R*₁ short, turned up to costa at cross-vein (head not narrowed behind) 7.
Tip of vein *R*₁ longer, continued at least a short distance beyond cross-vein 8.
7. No cross-vein in lower basal cell (Pl. III, figs. 12, 18, 20) *Phylidorea* Big.
A cross-vein near middle of lower basal cell (Pl. IV, figs. 15 and 16) *Idioptera* Mcq.
8. A cross-vein in lower basal cell; wings more or less spotted (Pl. IV, figs. 1—14) *Elaeophila* Rond.
No cross-vein in lower basal cell; wings unspotted 9.
9. Head narrowed behind (text-fig. 13, a, b); anterior pits of mesonotum conspicuous 10.
Head not narrowed behind (text-fig. 13, c) *Pylaria* Sint. 11.

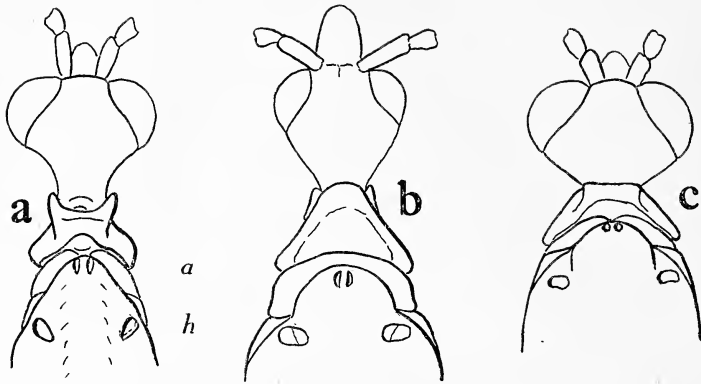


FIG. 13.

Head and front of thorax of Hexatomine genera: a, *Pseudolimnophila*; b, *Limnophila*; c, *Pilaria*. Note shape of head and prothorax; anterior pits (a) and humeral pits (h).

10. Pronotum large; wings normally spotted *Limnophila* Mcq., s.str.
Pronotum smaller; wings (in British species) unspotted *Pseudolimnophila* Alex.
11. Squama with a few hairs (text-fig. 12, a); humeral pits large, anterior pits small (text-fig. 13, c) *Pilaria* Sint., s.str.
Squama quite bare 12.
12. Humeral and anterior pits large, the latter confluent, forming a shining patch on front of thorax *filata* group.
Humeral and anterior pits small *nemorialis* group.

HEXATOMA Latr.

Syn. *Anisomera* Mg., *Peronecera* Curt.

(Pl. II, fig. 14.)

This genus, until recently placed in a separate subfamily or tribe, is now included in the same tribe with *Limnophila*, since most of the characters of both adults and larvae are similar. It is sufficiently distinguished from all other British Limoniidae by the venation, only three posterior cells being present; this, however, is not a fundamental character, as the closely allied genus or subgenus *Eriocera* has four or five posterior cells. The number of segments in the antennal flagellum is reduced, more especially in the males; in the females the number of distinguishable segments varies according to the species. The frons is very prominent; pronotum small; mesonotum very little arched; anterior pits absent; arculus complete; cerci of ♀ short and fleshy.

The flies are usually found on or over shingle in beds of rapid streams.

H. bicolor Mg.Syn. *lucidipennis* Curt., *aequalis* Lw.

Black, only bases of femora and halteres yellowish; thorax somewhat dusted with grey, especially between the praescutal stripes, abdomen shining. Antennae of ♂ almost as long as body; first three flagellar segments subequal in length, fourth somewhat shorter, fifth (last) minute. Antennae of ♀ scarcely as long as thorax, flagellum with eight or nine distinct segments, last few very small. Wings light greyish or nearly clear, with dark veins; R_{2+3} and R_2 subequal in length, r very near the fork (slightly before or beyond). Wing-length 9-12 mm.

Durham, Inverness, Nairn, Perth, Sutherland, Yorks. vi.

H. fuscipennis Curt. (Pl. III, fig. 14.)Syn. *burmeisteri* Lw.

Black, with pale yellowish halteres; thorax dusted with grey between praescutal stripes, abdomen also somewhat grey-dusted, hind margins of tergites sometimes very faintly and narrowly yellowish. Antennae shorter than thorax in both sexes; in ♂ with first flagellar segment considerably longer than second, third or fourth, fifth (last) minute; in ♀ with second flagellar segment about half as long as first, remainder together scarcely longer than second (number of segments in this terminal portion of antenna variable, but not more than four). R_2 usually less than half as long as R_{2+3} , r far before the fork. Wing-length 6-11 mm.

Inverness, Lanark, Nairn, Perth, Westmorland. v-vi.

Lackschewitz (MS., 1936) distinguishes between *burmeisteri*, with entirely dark abdomen, and *vittata* Meig., with narrow, pale bands to abdominal tergites. If the two species are distinct, both may occur in Britain; if not, the name *vittata* has precedence over *burmeisteri* and *fuscipennis*.

DACTYLOLABIS O.-S.Syn. *Rhinoptila* Now.

(Pl. III, figs. 7 and 8.)

This genus is readily distinguished from others of the *Limnophila* group by the position of cross-vein *m-cu*, which is constantly almost exactly at the base of the discal cell; the only other British members of the tribe in which this is sometimes (but not always) the case are *L. nemoralis*, *L. adjuncta* and the two species of *Idioptera*.

Dactylolabis has several other features which set it quite apart from most or all other Hexatomini. It agrees with *Epi-phragma* and *Austrolimnophila* in having no trace of anterior pits and only very small humeral pits on the mesonotum, and

also in the absence of the arcular cross-vein, though this feature is not so noticeable as in the other two genera because the origin of *M* is not so far from the base of the wing. It differs from *Epiphragma* and *Austrolimnophila* and resembles *Limnophila* (*Poecilostola*) in the large pronotum, which is only indistinctly divided into anterior and posterior portions. The hypopygium is peculiar in being turned forwards over the abdomen and the styles continuing the direction of the coxite instead of being infolded (which is never normally the case in other genera of the tribe) and also structurally in having the outer (ventral) style almost cylindrical and hairy all over while the inner (dorsal) style is bare.

D. sexmaculata Mcq. (Pl. III, fig. 7.)

Syn. *frauenfeldi* Egg.

Thorax blackish-grey, praescutum with four blackish stripes. Abdomen blackish, posterior borders of tergites narrowly yellowish. Legs not very slender; femora brownish with black tips. Wings with a large cloud at base of basal cells and another over base of *Rs*, extending over vein *M*, besides dark clouds on cross-veins, etc. Wing-length 7.5-9.5 mm.

Limestone hills. Derbyshire, Lancs, Montgomery, Perth, Salop, Somerset, Sutherland, Westmorland, Yorks. v-vi.

D. transversa Mg. (Pl. III, fig. 8.)

Syn. *tergestina* Egg.; *gracilipes* Lw.

Thorax and abdomen almost uniformly dark, praescutum unstriped. Legs more slender than in *sexmaculata*, femora darker. Wings without trace of cloud at base of basal cells and with only a small cloud over base of *Rs*; a slight dark shade sometimes present over middle of vein *M*; shade on distal section of *Cu* more pronounced than in *sexmaculata*. Wing-length 8-10 mm.

Wet rocks. Hereford (Wyre), Lanarkshire (Gorge of Avon), Montgomery, Salop, Westmorland (Witherslack), Yorks (Coverham). vi-vii.

Meigen's type proves that his *transversa* was this species and not *Amalopsis occulta*, as has sometimes been supposed.

EPIPHRAGMA O.-S.

(Pl. III, figs. 5 and 6.)

This genus was originally separated from *Limnophila* (sens. lat.) by the wing-pattern and the presence of a supernumerary cross-vein in the costal cell. These characters are by no means fundamental, but the separation is supported by a number of other small features in which *Epiphragma* differs from most

other members of the tribe. These characters are: (1) The third antennal segment is of a rather characteristic shape, being larger and more conical than usual. (2) There is no trace of the anterior thoracic pits. (3) The humeral pits are either absent or very small. (4) Dorsocentral hairs of thorax conspicuous. (5) Abdominal tergites each with a pair of transverse impressed shining lines at some distance from base. (6) The arculus is broken, *i.e.* there is no cross-vein connecting veins *R* and *M* near base of wing. (7) Vein *M* arises from *Cu* further from the wing-base than usual. (8) In the British species (though not in all the exotic species) the squama bears a few stiff hairs. (9) The outer style of the male hypopygium is hairy except on the slender, curved apical portion. (10) The early stages are spent in rather dry rotten wood.

E. ocellaris L. (Pl. III, figs. 5 and 6; text-fig. 14, a.)

Syn. *picta* F.

Antennae with scape dark, base of flagellum swollen and bright orange. Thorax rather hairy; three brown praescutal stripes usually obscured by pruinosity. Legs yellowish, femora with two narrow blackish rings on distal half, the outer ring well before the tip. Wings with the ocellate pattern variable in intensity but fairly constant in shape. Wing-length 9-12 mm.

Woods throughout Britain. v-vi.

In addition to the variation in intensity of wing-markings, *E. ocellaris* shows variation in the femoral rings; a form occurs in which the distal ring is very faint or absent, the proximal ring (near middle of femur) remaining distinct; conversely the proximal ring may be fainter than the distal one.

AUSTROLIMNOPHILA Alex.

(Pl. III, fig. 13.)

Syn. *Archilimnophila* Alex.

Although lacking the ocellate wing-pattern and supernumerary cross-vein, and with a normal, small third antennal segment, this genus agrees with *Epiphragma* in most other respects. Thus the anterior thoracic pits are lacking, humeral pits very small, and dorsocentral hairs well developed; the abdominal tergites have similar impressed shining lines, which are absent or hardly distinguishable in most other genera of the tribe (though present also in *Limnophila* s.str. and *Pseudolimnophila*); the basal venation of the wing is the same, the arculus being broken and the origin of *M* being more distal than usual; the outer style of the male hypopygium resembles that of *Epiphragma* (text-fig. 14, a, b); and the early stages are passed in rotten wood.

Austrolimnophila was proposed for a Patagonian species (*eutaeniata* Big.) and many species from Chile, Argentina, New Zealand and Australia have since been referred to it; *Archilimnophila* has recently been introduced (Alexander, 1934) for two North American species and the European *L. ochracea* Mg. All these species share all the characters mentioned above, and as I do not see any sufficient reason for separating *Archilimnophila* from *Austrolimnophila* I use the earlier name for the whole group.

Apart from *L. ochracea* Mg. the only European species, among those which I have examined, which seems referable here is *L. prolixicornis* Lundst.

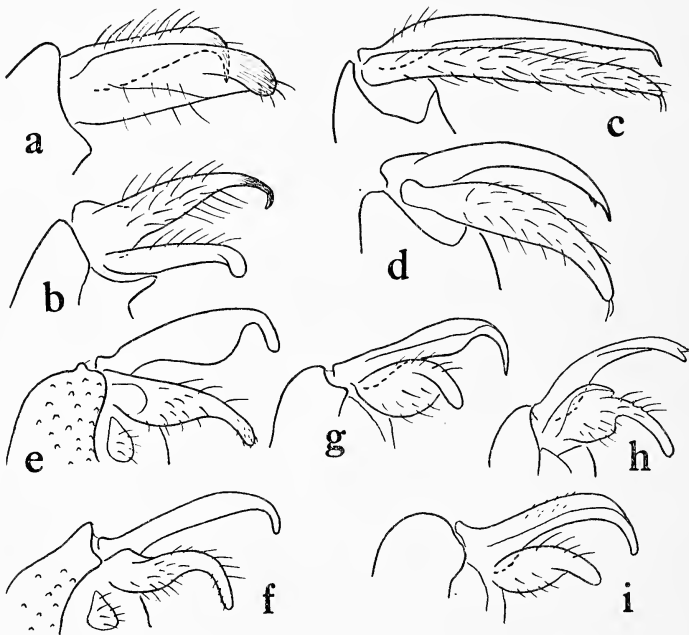


FIG. 14.

Styles, with tip of coxite, of Hexatomini: a, *Epiphragma ocellaris*; b, *Austrolimnophila ochracea*; c, *Pseudolimnophila sepium*; d, *Pilaria discicollis*; e, *Phylidorea meigeni*; f, *Ph. phaeostigma*; g, *Ph. squalens*; h, *Ph. fulvo-nervosa*; i, *Idioptera pulchella*.

A. ochracea Mg. (Pl. III, fig. 13; text-fig. 14, b.)

Syn. *aberrans* Walk., *tempestiva* Walk.

Head dark grey; antennae (♂ ♀) all dark, short, with short verticils. Thorax light brownish, mesonotum more or less darkened, surface dull. Abdomen brownish, segment 9 in ♂

black. Legs uniformly brownish, wings clear with faint stigma. Wing-length 8-11 mm.

Common throughout Britain. v-vii.

LIMNOPHILA Mcq., sens. lat.

The subgenera into which the old genus *Limnophila* was divided by Osten-Sacken have been treated by many writers as separate genera. It is generally agreed that they are better defined and more fundamentally different than the subgenera of *Limonia* (there are striking differences in the larvae and pupae, which is not the case in *Limonia*), but they are not all of equal value, and if some only of the groups are admitted to generic rank differences of opinion arise as to how many should be treated in this manner; thus most European writers have treated *Elaeophila* and *Idioptera* as distinct genera, but Alexander places them as subgenera, while at the same time raising some other groups (as *Pilaria* and *Pseudolimnophila*) to generic rank. I personally am in favour of wide rather than narrow limits for genera and therefore prefer to treat most of the groups as subgenera, as there appear to be no very clearly marked adult characters applicable to both sexes by which they may be separated, such groups including *Pilaria* and *Pseudolimnophila* as well as *Phylidorea*, *Idioptera*, *Elaeophila* and *Limnophila*; I would, however, admit *Epiphragma*, *Austrolimnophila* and *Dactylolebia* as distinct genera for the reasons already stated. This of course is merely my personal preference, and probably each and every other student will have his own more or less distinct view.

Subgenus **PHYLIDOREA** Big.

Syn. *Limnophila* auct. p.p.

(Pl. III, figs. 12, 18, 20; text-fig. 14.)

The name *Phylidorea* has to be used for a large section of the old genus *Limnophila* with the characters of the genotype (*ferruginea* Mg.), the name *Limnophila* being more correctly applied to the group formerly known as *Poecilostola*. The characters of *Phylidorea* are as follows:—

Head not obviously narrowed behind. Antennae with verticils short, basal flagellar segments not noticeably thickened. Pronotum small. Anterior pits of praescutum very small but almost always distinguishable (except perhaps in those species with shining thorax); humeral pits large. Abdominal tergites without shining transverse impressed areas. Squama and stigma bare. Venation: Arculus complete (*i.e.* a definite cross-vein joining *R* and *M* below humeral cross-vein); no supernumerary cross-veins; *R*₁ turned up to costa at cross-vein, the terminal

portion not or scarcely longer than the cross-vein. Hypopygium: Outer style bare but not blackened, sometimes flanged or variously twisted but rarely distinctly bifid at tip and without fine serrations, usually rather stout; aedeagus large and with one or two pairs of appendages (parameres?), very varied in form in the different species.

The British species of *Phylidorea* fall into two well-marked groups as indicated in the key; these two groups might well be treated as subgenera, the characters separating them being quite as strong and definite as between some of the other subgenera. The species of the second group show most of the characters of *Idioptera*, except that they do not possess the accessory cross-vein in the lower basal cell. The close relationship of these species to *Idioptera* is clearly shown in the hypopygium, that organ being very similar indeed in *squalens*, *glabricula*, *bicolor*, *fasciata* and *pulchella* (not only in the styles, as shown in text-fig. 14, g and i, but also in other parts).

The first four species of the first group have a hypopygium of a rather peculiar type, differing considerably from the other species, and in three of these (*phaeostigma*, *dispar* and *lineola*) it is apparently identical in structure—at least I have failed to discover any obvious and constant distinctions. (It is curious that de Meijere, who examined and even figured the hypopygia of these species, failed to notice this identity of structure.) Although there do not appear to be any morphological distinctions between these three forms, the colour differences are very clear and definite, and are certainly not seasonal (as seems to be at least partly the case in the somewhat similar trio of *Limonia affinis*, *mitis* and *lutea*); the three have always been regarded as distinct species, and it seems best to continue to treat them as such for the present.

KEY TO BRITISH SPECIES OF PHYLIDOREA.

1. *Rs* short, about equal in length to R_{2+3} , or only slightly longer or shorter, fork of R_{2+3} rather shorter; antennae (except in *heterogama*) alike in the two sexes, not or scarcely longer than head and thorax together; wings unmarked except for stigma (Group I) 2.
Rs long, twice as long as R_{2+3} or more, fork of R_{2+3} longer; antennae of ♂ longer than in ♀ and fully half as long as wing; wings with slight clouds on cross-veins and base of *Rs* (Group II) 9.
2. Larger species, wings of ♀ normal 3.
 Small, greyish-brown species; antennae of ♂ rather long and wings of ♀ rather short *heterogama* Berg.
3. Wings with very distinct stigma; abdomen dark (except in *lineola*) ... 4.
 Wings without obvious stigma; body mainly yellowish 7.
4. Thorax black 5.
 Thorax largely yellowish 6.
5. Mesonotum largely shining *meigeni* Verr.
 Mesonotum grey-dusted *phaeostigma* Schum.
6. Wings pellucid; femora mainly blackish *dispar* Mg.
 Wings yellowish; femora black at tips only *lineola* Mg.

7. Thorax with a black central line, at least indicated in front; head pale grey 8.
 Thorax entirely ochreous; head dark *ferruginea* Mg.
 8. Discal cell closed as usual *fulvonervosa* Schum.
 Discal cell open *aperta* Verr.
 9. Head and thorax yellow *glabricula* Mg.
 Head and thorax blackish 10.
 10. Abdomen black and slender in both sexes *squalens* Zett.
 Abdomen largely orange in ♂, black but stout in ♀ .. *abdominalis* Staeg.

L. (Ph.) meigeni Verr. (Text-fig. 14, e.)

Syn. *nigrina* Mg. (preocc.).

Head dark grey; antennae all blackish, first few flagellar segments very shortly oval. Thorax black (scutellum often brownish), pleurae grey-dusted, mesonotum somewhat shining, especially towards front in middle. Abdomen black, somewhat shining, genitalia usually reddish. Legs black, coxae yellow, bases of femora yellow to a variable extent. Wings faintly tinged, yellow at base, stigma dark and conspicuous, vein *Cu* noticeably dark; base of *Rs* sometimes faintly darkened. Wing-length 8-12 mm.

Hypopygium: Tergite with a pair of hairy processes in middle (usually turned inwards and not visible in the dry specimen); coxite with numerous yellow hairs and with small basal lobe; inner style simple; outer style pale, bare, straight, but much widened on inner margin beyond middle, distal portion narrowed and hooked, tip blunt; aedeagus with two pairs of pale appendages, upper pair semi-tubular like the penis and somewhat longer than the latter, lower pair usually rather shorter (but rather variable in length), more slender and pointed.

Abundant on heaths and moors. Surrey and Hants to Sutherland and St. Kilda. v-ix.

De Meijere and other recent authors have placed *meigeni* as a synonym of *phaeostigma*, not recognising that two closely-allied species are involved; the two differ most obviously in the male hypopygium (text-fig. 14, e and f), but are also distinguishable by features of the antenna and thorax.

* **L. (Ph.) phaeostigma** Schum. (Pl. III, fig. 12; text-fig. 14, f.)

Very similar to *meigeni*, differing as follows: Antennae in both sexes slightly longer, the flagellum reddish-brown rather than black, and the basal segments more elongate-oval. Mesonotum with almost uniform (though not very heavy) grey dusting, the praescutum not obviously shining even in middle in front. Wings clearer (but this is only obvious when series of specimens are compared).

Hypopygium: Coxite less hairy; both inner and outer styles rather differently shaped, the outer style of almost uniform width to just before the tip, inner style more curved; aedeagus

larger in proportion to remainder of hypopygium, though otherwise similarly constructed.

Argyll (Kilmun), Arran (Brodick), Dumbarton (Bonhill), Inverness (Loch Morlich), Stirling (Balmaha), Sutherland (Loch Maree). v-vi.

Perhaps overlooked elsewhere through confusion with *meigeni*.

Schummel described only the female, but as he mentioned the uniformly grey thorax and reddish-brown antennal flagellum there can be little if any doubt that this is his species.

L. (Ph.) dispar Mg.

Head dark grey. Antennal segments 2-6 more or less yellowish. Thorax orange-yellow, somewhat dusted, with a broad but ill-defined blackish stripe from pronotum about half-way to suture. Abdomen light to dark brown above, paler beneath, segments 8-9 blackish. Legs brown to black, bases of femora yellow. Wings nearly clear but with conspicuous dark stigma. Venation as in *phaeostigma*. Wing-length 12-14 mm.

Hypopygium almost exactly as in *phaeostigma*.

Common in the South: Kent and Devon to Essex and Herts. v-vi.

I have seen no typical *dispar* from Scotland, but a male from Aviemore and a female from Hawkhead (Renfrew) are somewhat intermediate between *dispar* and *phaeostigma*, having the mesonotum brownish with three subconfluent blackish stripes, pleurae yellowish, and abdomen blackish.

L. (Ph.) lineola Mg.

Head dark grey. Antennal segments 2-6 more or less brownish. Thorax light brownish, heavily dusted, with a broad but ill-defined median blackish stripe extending nearly back to suture, sometimes also a pair of shorter lateral stripes and a dark patch in middle of pleurae. Abdomen light brownish. Legs brown, tips of femora indefinitely darker. Wings with a strong brownish-yellow tinge, stigma brown but not conspicuous. Venation as in *phaeostigma*. Wing-length 10-14 mm.

Hypopygium closely resembling *phaeostigma*, but sternite perhaps more deeply emarginate and aedeagus perhaps differing slightly in form.

Arran, Cambs, Carnarvon, Flint, Herts, Hants, Salop, Sussex. v-ix.

L. (Ph.) fulvonervosa Schum. (Text-fig. 14, h.)

Syn. *lineolella* Verr.

Head pale ash-grey. Antennal flagellum yellowish at base, scape dark. Thorax orange-yellow, shining, with a narrow

black median line from pronotum almost to suture. Abdomen yellowish, sometimes darker above, segments 8-9 not blackened. Legs light brownish, tips of femora indefinitely darker. Wings almost clear, stigma faint. Venation as in *phaeostigma*. Wing-length 9-11 mm.

Hypopygium: Tergite with margin concave, without processes; coxite with small basal lobe; inner style lobed at base; outer style pale, bare, divided at tip into two triangular points; aedeagus with two pairs of blackened and sharp-pointed appendages, upper pair much shorter than the large, flattened and blackened penis, lower pair longer.

Common. Kent and Devon to Inverness.

Occasional aberrations of venation occur; the British Museum possesses one male (otherwise typical, e.g. in hypopygium) in which cell M_1 is lacking.

L. (Ph.) aperta Verr. (Pl. II, fig. 20.)

Very similar to *fulvonervosa*, but smaller; dark median line of thorax narrower and fainter (sometimes hardly distinguishable) and discal cell open (venation otherwise similar). Wing-length 7.5-9.5 mm.

Hypopygium very different from *fulvonervosa*: tergite with a deep and wide V-shaped emargination, at the bottom of the V a single small projection; inner style simple; outer style enlarged on inner side before tip, ending in a single curved blunt claw; aedeagus quite different.

Local. Sussex and Devon to Sutherland. vi-vii.

L. (Ph.) ferruginea Mg.

Syn. *unicolor* Walk.

Head rather dark brownish, heavily dusted. Antennae rather longer than in the *phaeostigma* and *fulvonervosa* groups, segments more spindle-shaped, scape (or at least second segment) yellowish. Thorax entirely orange, mesonotum shining. Abdomen brownish-orange, segments 8-9 in ♂ black (but coxites yellowish as usual). Legs light brownish, tips of femora more or less darkened. Wings somewhat yellowish; stigma more or less indicated, often darker about the cross-vein; base of *Rs* usually dark but not clouded. Venation almost as in *phaeostigma*, but length of fork of R_{2+3} variable—sometimes well before and sometimes at the cross-vein. Wing-length 6.5-10 mm.

Hypopygium: Tergite emarginate, without processes; coxite with apical as well as basal lobes; inner style enlarged at base without being lobed; outer style curved, tip abruptly narrowed and pointed; aedeagus with only one pair (ventral) of pointed appendages and a pair of broad lobes.

Common throughout the British Isles. v-ix.

* **L. (Ph.) heterogama** Bergr.

The smallest British species of the genus; without special ornamentation, but easily distinguished by its narrow wings, somewhat abbreviated in ♀.

Head dull dark brownish; antennae in ♂ all blackish, considerably longer than head and thorax together, in ♀ paler and much shorter. Thorax rather heavily dusted, brownish above, greyish on sides. Abdomen dark brown, segments 8-9 black. Legs brownish, femora in ♂ darker, almost black except at base. Wings clear, without stigma. Venation resembling that of *ferruginea*, but tip of R_1 more or less obsolete, and forks of R_{2+3} and M_{1+2} rather shorter, with more divergent branches; R_s with or without spur near base. Wing-length, ♂ 5-6 mm., ♀ about 4 mm.

Hypopygium: Tergite emarginate in middle; coxite with ventral basal lobe; outer style pale, abruptly narrowed near tip, the terminal portion not sharply pointed; aedeagus with one (ventral) pair of appendages which are broad at base, ending in long needle-like points.

Salop (Whixall Moss, 22.viii.36, C. H. W. Pugh).

L. (Ph.) glabricula Mg.

Head yellow, the colour somewhat obscured by grey dust when viewed from behind. Antennae (♂) fully half as long as wing, first three segments yellow, remainder darker, faintly ringed. Thorax wholly shining orange-yellow, abdomen similarly coloured but black-marked at sides, ninth segment black. Legs yellow, tips of femora rather broadly and of tibiae narrowly black. Wings such as in *squalens*, but cross-veins scarcely clouded. Wing-length 7 mm.

Hypopygium: Tergite slightly emarginate, without processes; coxite with a small thumb-like projection at base; inner style normally simple (in one specimen it is deeply bilobed on one side, simple on the other); outer style ending in one curved point; aedeagus with one pair of appendages which are remarkable in being covered with numerous short spines.

Argyll (Kilmun), Carnarvon (Llyn Dinas), Cumberland (Skirwith), Perthshire (Rannoch), Westmorland (Ullswater). vi-vii.

This is the species recorded by Verrall as *punctum* Mg. The latter has not yet been found in Britain; it is a yellowish species superficially rather like *glabricula*, but with head grey, tips of femora and tibiae not definitely black, pubescent wing-tip, and hypopygium quite different. It has been placed by Alexander in a separate subgenus *Tricholimnophila*, and also (under the name *helvetica*) served as the type of Bergroth's genus *Adelphomyia* (see p. 93), which should strictly be used in place of *Tricholimnophila* if the latter be separated from *Phylidorea*.

L. (Ph.) squalens Zett. (Pl. III, fig. 18; text-fig. 14, g.)Syn. *tarda* Walk.

Head dark grey. Antennae all black; in ♂ twice as long as head and thorax together, with long verticils at middle of segments and longish pubescence; in ♀ only about as long as thorax. Thorax black, rather heavily dusted with dark grey. Abdomen all blackish (♂ ♀), not specially stout in ♀. Legs black, coxae and bases of femora yellowish. Wings greyish, stigma rather dark brown, a small brown cloud over base of *Rs*, cross-veins and wing-tips slightly clouded. *Rs* angled and usually spurred at base, somewhat longer in the *phaeostigma* group. Wing-length 5-8 mm.

Hypopygium: Tergite with a pair of rounded projections close together in middle; coxite with a long bare finger-like process dorsally at base, in addition to the usual small basal lobe; inner style not lobed; outer style flanged dorsally, ending in one long, curved, pointed claw; aedeagus with one pair of bilobed appendages.

Common on peat bogs. Devon and Hants to Inverness, Kerry. v-vii.

This is the species recorded by Verrall as *L. bicolor* Mg. The true *bicolor*, as determined by de Meijere and Lackschewitz, has not yet been found in Britain, though it may very likely occur; it is very similar to *squalens*, but rather larger and with broader wings and different hypopygium (tergite emarginate in middle, without processes; coxite with only a short basal process). Lundstroem's figures of the two species (*Acta Soc. Fennica*, 1912) are reversed.

L. (Ph.) abdominalis Staeg.Syn. *robusta* Wallgr.

Head and thorax much as in *squalens*, but ♂ antennae not quite so long and with shorter verticils. Abdomen in ♂ largely orange, but segments 2-5 banded with black at base, 8 all black. Abdomen in ♀ all black and unusually broad and stout. Legs stouter than in *squalens*, especially in ♀. Wings resembling *squalens*, but *Rs* longer and dark clouds less obvious, stigma with only its distal end dark. Wing-length 6-8 mm., sometimes shorter in ♀.

Hypopygium: Tergite with a shallow v-shaped emargination; coxite without process or lobe at base; inner style broad, almost triangular, with one long bristle besides the hairs; outer style bifid at tip, both points sharp and blackened; aedeagus simple; parameres long, straight, blunt-tipped.

Dorset, Hants, Yorks. vi-ix.

Subgenus **IDIOPTERA** Mcq.

(Pl. IV, figs. 15 and 16.)

This subgenus differs from others in the genus *Limnophila* (sens. lat.), except *Elaeophila* (*Ephelia*), in the possession of a cross-vein in the lower basal cell. These two subgenera have sometimes been united (as by myself in 1921), but a careful study shows that the differences between the two are much more noteworthy than the common possession by both of them of the accessory cross-vein. The species of *Idioptera* (excluding *trimaculata*) resemble the species of the second group of *Phylidorea* not only in the structure of the hypopygium (text-fig. 14, g and i) and in the lengthened antennae of the males, but also in venation, notably in the short, upturned tip of R_1 , and in the rather long and narrow discal cell, with *m-cu* well before its middle. The species of *Elaeophila*, on the other hand (including *trimaculata*) have a quite different type of hypopygial structure (text-fig. 15) and differ from *Idioptera* and the second group of *Phylidorea* in several details of venation, such as the distinctly produced tip of R_1 and the shorter and broader discal cell, with *m-cu* near or beyond its middle; there is also a difference in the position of the accessory cross-vein, which in *Idioptera* is below or even before the base of R_s , whereas in *Elaeophila* it is almost always well beyond the base of R_s . The type of wing-markings in the two subgenera is again quite different, *Idioptera* having characteristically banded wings.

Specimens of both *I. fasciata* and *pulchella* occasionally occur in which the accessory cross-vein is lacking on one or both wings; such specimens may also lack the dark area which normally borders the cross-vein, but may easily be recognised by the remaining wing-markings.

L. (I.) fasciata L. (Pl. IV, fig. 16.)

Antennae of ♂ slender, two-thirds as long as wing, dark, with very narrow pale rings at joints. Thorax very heavily pruinose, light blue-grey, with little trace of markings. Abdomen yellow, unbanded. Femora and tibiae mainly yellow, broadly black apically. Wing-bands very conspicuous, their centres usually lighter than their margins; basal band usually reaching posterior margin. Cell M_1 short, occasionally absent. Wings of ♀ well developed. ♂ wing 8-9 mm.

Hypopygium: Tergite slightly emarginate; coxite without projection at dorsal root; outer style sharp-pointed; penis sinuous.

Cheshire (Delamere, Wilmslow), Westmorland (Cliburn Moss), Yorks (Austwick, Giggleswick). v-vii.

L. (I.) pulchella Mg. (Pl. IV, fig. 15; text-fig. 14, i.)

Antennae of ♂ less slender than in *fasciata*, barely half as long as wing, all dark. Thorax darker grey than in *fasciata*, with an ill-defined darker median stripe. Legs black except bases of femora. Wing-markings rather variable, but less intense than in *fasciata*, usually forming less complete bands, tint more uniform; basal spot not reaching posterior margin. Cell M_1 longer. Wings of ♀ functionless, half length of abdomen. ♂ wing 6-8 mm.

Hypopygium: Coxite with small bare thumb-like projection at dorsal root; outer style rather blunt-tipped; penis straight.

Cheshire (Wilmslow), Inverness (Aviemore), Kirkcudbright (Lochend), Lanark (Frankfield), Lancs (Bacup, Whalley), New Forest, Staffs (Blakemere), Warwick (Sutton), Yorks (Eldroth).

subgenus **ELAEOPHILA** Rond.

Syn. *Ephelia* Schin.

(Pl. IV, figs. 1—14, 17; text-fig. 15.)

This group is easily recognisable, as a rule, by the presence of a cross-vein in the middle of lower basal cell in combination with the spotted wings; both these characters, however, are evidently of quite secondary importance, and specimens not infrequently occur which lack the accessory cross-vein on one or both wings or which have the wing-markings very much reduced. More important taxonomically, though less obvious, are the characters of the male hypopygium, notably the form of the outer style, which is flattened, blackened, and with fine serrations on its outer margin distally; parameres are small and of rather characteristic clubbed form. In the venation an important feature is that the tip of R_1 is produced well beyond the cross-vein (less so, however, in *trimaculata*). The antennae (except in *trimaculata*) have the basal part of the flagellum swollen, the rest slender but with short verticils.

Apart from the features mentioned, *Elaeophila* has most of the characters of *Phylidorea*: head not narrowed behind; pronotum rather small; anterior pits small but fairly distinct; humeral pits large; tergites without obvious impressed areas; arculus complete; squama and stigma bare.

In 1921 I suggested including all species of the *Limnophila* group with a cross-vein in the lower basal cell in the genus *Idioptera* Mcq. I now recognise, however, that *Idioptera* and *Ephelia* are not at all closely related, and have therefore again separated the two; the points of distinction are dealt with under *Idioptera*. The species *trimaculata* Zett. has usually been placed in *Idioptera*, but in both venational and hypopygial characters is almost a typical *Elaeophila*, and is therefore included here, though it stands somewhat apart from the other species.

All the species except *trimaculata* (and varieties of *submarmorata*) have wing-markings of the same general type, with seven main dark spots on or close to the costal margin: (1) over humeral cross-vein; (2) at middle of *R*; (3) over and above base of *Rs*; (4) at tip of *Sc*; (5) over *r* and tip of *R*₁—the stigma; (6) at tip of *R*₂; and (7) at tip of *R*₃.

L. (E.) trimaculata Zett. (Pl. IV, fig. 17; text-fig. 15, g.)

Antennae in both sexes slightly longer than head and thorax together (in ♂ not or scarcely longer than in ♀), most flagellar segments elongate-oval, entirely dark. Thorax and abdomen uniformly dark brown. Legs dark. Wings slightly smoky, with small indefinite darker clouds at base of *Rs*, tip of *Sc* and stigma; occasionally an additional dark cloud in middle of *Rs*. Tip of *Cu* strongly curved to margin, much as in *fasciata* and in contradiction to the other species of *Elaeophila*. Wing 5-8mm.

Hypopygium with outer style blackened and finely serrate on outer margin, but narrower than in *maculata* group.

Peat bogs. Arran, Denbigh, Devon, Montgomery, New Forest, Perthshire. iv-vi.

L. (E.) verralli Bergr. (Pl. IV, fig. 8; text-fig. 15, e, h.)

Syn. *dalei* de Meij., Edw.

Antennae alike in the two sexes, shorter than thorax, first few flagellar segments thicker and rounded, entirely dark. Thorax dark, pruinose, praescutum with a pair of median brown stripes more or less obvious, but without other dark markings at sides. Abdomen blackish. Legs dark, femora gradually darkened from base to tip. Wings narrow in both sexes; the seven dark costal spots almost equidistant, the first very small; slight clouds over cross-veins and tips of all veins, rarely a few small clouds on courses of veins; vein *R*₄₊₅ rather faintly dark-margined throughout. Usually no spur on vein 2*A*, but this sometimes occurs. Wing 7 mm.

Hypopygium: Outer style with a strong tooth in middle of distal margin; coxite without spinules at inner root; penis long.

Stream-sides. Derbyshire, Devon, Dorset, Hants, Salop, Warwick, Westmorland. v-vi.

Bergroth in his description of *E. verralli* stated that in some of his specimens the femora were yellow with black tips and that in most of them there was a spur on vein 2*A*. I therefore concluded in 1921 that some of his specimens, if not all, were mere variants of *E. marmorata*, and proposed the new name *dalei* for the present form. However, Bergroth wrote to me that he considered *dalei* to be the same as his *verralli*, and moreover all the specimens in Mr. Collin's collection from Sutton and Dovedale (the two localities mentioned by Bergroth) determined as *verralli*

are *dalei*; these specimens probably include the types, as Dr. Frey informs me that Bergroth did not retain any specimens in his collection. The synonymy can therefore be considered as established.

The species was first recorded as British by Bradley under the name *variinervis* Zett.; Zetterstedt's species, however, is a Pediciine form.

L. (E.) apicata Lw. (Pl. IV, fig. 9; text-fig. 15, f, i.)

Syn. *maculatifrons* Pierre (1924 b).

Head with two dark brown stripes (more or less developed) and a dark spot in middle of frons. Antennae, thorax and legs as in *maculata* (thoracic markings rather less conspicuous). Wing-markings of the type of *maculata* and *submarmorata*, with third and fourth costal spots widely separated, but no small dots along veins; markings at wing-tip distinctive, the sixth and seventh costal spots being joined below in cells R_3 and R_5 , leaving a small pale area at extreme tip of R_{4+5} . Wing 7-8 mm.

Hypopygium: Resembles *submarmorata*, but outer style of different shape (more like *mundata*), aedeagus larger, penis much longer and stouter.

Stream sides. Carnarvon, Denbighshire, Devon, Dumbarton, Inverness, Merioneth, Perth, Sutherland, Wexford. vii-viii.

The wing-markings in this species are very constant.

L. (E.) mundata Lw. (Pl. IV, fig. 10; text-fig. 15, d.)

Head almost uniformly dark greyish. Antennae, thorax and legs as in *maculata*. Wings differing from *maculata* and resembling *verralli* in having vein R_{4+5} uniformly dark-margined, but resembling *maculata* and *submarmorata* and differing from *verralli* in having the first costal spot (over humeral cross-vein) large, and the third and fourth widely separated, also the small spots at tips of veins more distinct; no small dots along courses of veins. Wings 7.5-9 mm.

Hypopygium: Extremely similar to that of *submarmorata*, but outer style differing slightly in shape (several specimens from widely separate localities compared).

Local. Cheshire, Cumberland, Dumbarton, Hereford, Inverness, Montgomery, Perth, Somerset, Sutherland, Westmorland, Yorks.

The wing-markings in this species are very constant.

L. (E.) maculata Mg. (1804). (Pl. IV, figs. 11 and 12; text-fig. 15, a, c.)

Syn. *marmorata* Mg. (1818).

Head dark greyish, with an ill-defined darker brownish area in middle. Antennae alike in the two sexes, shorter than

thorax, first three or four flagellar segments thicker and rounded, base of flagellum (1 or more segments) yellow, antennae otherwise dark. Thorax dark, praescutum with variable brown markings, typically a pair of median stripes with a smaller pair of stripes adjacent to them posteriorly, and other adjacent marks on each side at middle. Abdomen more or less translucent brownish. Legs yellow, tips of femora and tibiae narrowly blackish. Wings broadened in middle in ♂ (not in ♀), the hind margin almost angled near tip of vein 2A; membrane heavily spotted and dotted with dark brown, usually with many small dots along courses of veins; the seven main costal spots not all equidistant, fourth much nearer to fifth than to third; R_{4+5} with a number of dark dots, never uniformly dark-bordered; cross-vein in lower basal cell only narrowly dark-bordered, even in the darkest specimens. In ♂ (not ♀) vein 2A usually has a short spur near tip. Wing 9-11 mm.

Hypopygium: Tergite rather prominent (but squared off in middle); sternite with a conspicuous lip-like projection in middle beneath; coxite with a small group of spinules at inner root; outer style very broad, with only five teeth on distal margin and a small terminal tooth; penis very short, not extending beyond spinules of coxite.

Stream-sides and watercress beds. Kent and Devon to Sutherland. v-vii.

The wing-markings vary somewhat in density but are always of the same general type. Occasional specimens have the small spots on the veins very much reduced in number, and these rather closely resemble the var. *oligosticta* of *submarmorata*, but the second costal spot is larger. Numerous hypopygial mounts show no noticeable variation in this organ. Some (not all) specimens from Sutherland have the mesonotum uniformly rusty-brown, without markings.

var. **decora** Hal. (Pl. IV, fig. 13.)

Differs from the typical form in having the wings more extensively dark; veins R_3 and R_{4+5} entirely or almost entirely included in one large dark area.

Hypopygium quite as in typical *maculata*.

One male, and a second specimen without abdomen, in Haliday's collection in Dublin, are probably the types of *decora*, though not so labelled. Haliday recorded the specimens from near Belfast; the Dublin Museum also possesses another very similar broken specimen from Clare Island. These two broken specimens are even darker than the one illustrated (which may be taken as the type), and very much resemble a figure given by Riedel (Ent. Rundschau, 36, 1919) of what he regards as a dark variety of *submarmorata*.

var. **aegle**, n. (Haliday MS.). (Pl. IV, fig. 14.)

Wings much paler than the typical form; costal cell entirely clear and the dark clouds on the veins only faintly indicated; a slight brown suffusion fills the whole of the lower basal cell; the only fairly distinct spots are those at stigma and base of *Rs*.

Two females (both with wings almost precisely alike) in Haliday's collection in Dublin, labelled 'Ireland.'

This form shows some resemblance to the vars. *pentasticta* and *suffumata* of *submarmorata*, but looks quite distinct. It may be a form of *submarmorata* rather than of *maculata*, but the traces of numerous small dark spots on the veins indicate the latter. Possibly it may be the female of *decora*.

A male from Wexford (*King*) is intermediate between *aegle* and typical *maculata*; it has the costal cell mainly clear but with small spots in positions 1 and 4; wings mainly pale but with fairly numerous small dark dots on veins.

The name *aegle* appeared as a *nomen nudum* in the second edition of Curtis' 'Guide.' In Haliday's MS. list of Irish insects the name *aegle* is struck out and replaced by *trimaculata* Zett., which explains why Haliday never published a description. There are no specimens of *trimaculata* in Haliday's collection, but the two females described above are superficially similar to *trimaculata* and are doubtless those Haliday had under this name.

L. (E.) submarmorata Verr. (Pl. IV, figs. 1, 2; text-fig. 15, b.)

Head, antennae, thorax and legs as in *maculata*, also shape of wing in ♂. Wing-markings similar, but small dots on courses of veins usually less numerous (sometimes absent), and dark border to cross-vein in lower basal cell usually much broader, even in less heavily-marked specimens. In the typical form all the seven main costal spots are well developed, second extending right across costal cell, fourth including tip of *Sc*; sixth and seventh sometimes united in cell *R*₃, but if so the extreme tip of *R*₄₊₅ is usually dark; small but distinct spots at tips of all veins (except sometimes *R*₄₊₅). Wing 6-9 mm.

Hypopygium: Tergite more truncate than in *maculata*; sternite with the lip-like projection much less pronounced; ventral piece of aedeagus somewhat differently shaped; other characters exactly as in *maculata* (numerous specimens examined, the differences noted above apparently constant).

Stream-sides and watercress beds, often in company with *maculata*. Arran, Brecon, Bucks, Derby, Devon, Dorset, Hereford, Kent, Kerry, Perthshire, Staffs., Sussex, Yorks.

I previously treated this as a variety of *maculata* (*marmorata*) and de Meijere and Lackshewitz took the same view, but as I have now observed a small though fairly definite difference in

genitalia (fig. 15, a and b) I accept Verrall's view as to the distinctness of the two species. In addition to the structural difference, there seems to be a slight difference in the mating habits; the 'swarming' of the males at dusk in the case of *maculata* takes place at a higher elevation (about 6-8 ft. from the ground) than in the case of *submarmorata* (about 4-6 ft.).

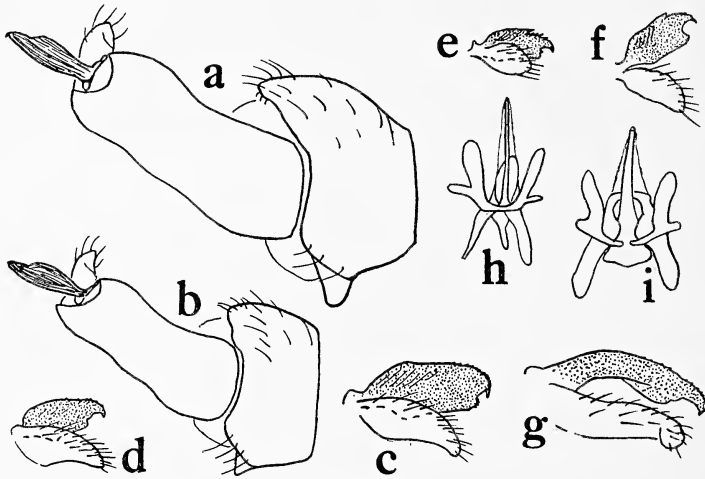


FIG. 15.

a, b, Hypopygia of *Elaeophila* in side view: a, *maculata*; b, *submarmorata*.
e-g, Styles of *Elaeophila*: c, *maculata*; d, *mundata*; e, *verralli*; f, *apicata*;
g, *trimaculata*.

h, i, Aedeagus of *Elaeophila*: h, *verralli*; i, *apicata*.

The wing-markings as described above are those of the typical form, which is usually the most numerous and in some localities the only form of the species to be met with. In addition to this typical form, four or five others which are rather sharply definable on wing-pattern occur in Britain; these are named and described below. Although some of these forms are strikingly different from the typical form (and even from all other allied species of *Elaeophila*) I can only regard them as varieties of *submarmorata* because (1) the hypopygial and other structural characters are identical in all, the differences being confined to the wing pattern; and (2) several if not all of the forms may occur together at the same place and time, together with a small percentage of intermediates—thus the late Rev. A. E. Eaton took all the forms except *bistriata* near Seaton on 29.v.1905, and I myself took all except *eatoni* in one spot near Branscombe on 6.vi.1937.

var. **oligosticta** n. (Pl. IV, fig. 4.)

Wing-spots more restricted than in typical form though usually blacker and sharply defined; first 'costal' spot small; second also very small, usually confined to basal cell and veins Sc and R_1 , rarely extending across costal cell; third fairly large but much narrowed towards costa; fifth small and usually leaving tip of Sc_1 free; seventh very small, sometimes absent; spots on tips of veins round wing-apex smaller than in typical form; R_{4+5} largely clear (an obvious distinction from *mundata*, which is somewhat similar).

Devon (Sidmouth, Edge Barton, Bindon Landslip), Hereford (Mordiford, Middle Park), Sussex (Crowborough), Yorks. (Wentworth).

var. **bistriata** n. (Pl. IV, fig. 3.)

Wings both spotted and streaked; the usual seven 'costal' spots all represented, though 1 and 2, and sometimes also 3, are reduced and do not reach costa; 4, 6 and 7 small but quite distinct; dark dots present at tips of veins; a broad dark suffused stripe covers vein R_{4+5} except at its tip, and a second extends along most of Cu and tends to fill lower basal cell.

Devon (Edge Barton, 4 ♂, 4 ♀).

A single specimen in Mr. Collin's collection from Tunbridge Wells resembles this form in having an elongate streak on vein Cu , but the remaining wing-markings are as in the typical form, which also occurred at the same place and time.

var. **eatonii** n. (Pl. IV, fig. 7.)

Costa with seven dark areas arranged in the usual manner and separated by pale yellowish areas; remainder of wing almost entirely suffused with grey, without obvious darker or lighter markings, so that the wing might be described as dark with light costal spots rather than as light with dark spots.

Devon (near Seaton, 29.v.05, 1 ♂).

var. **suffumata** n. (Pl. IV, fig. 5.)

Wing streaked rather than spotted; the only indications of spots are at the base of Rs , the stigma, and a small subapical one below tip of $2a$; on the other hand, a conspicuous broad streak or suffusion covers R_{4+5} (except its extreme tip) and extends less definitely along Rs , being connected also with the stigma and sometimes covering also a greater or less extent of R_3 ; another broad streak extends along nearly the whole of Cu and tends to fill lower basal cell; a dark suffusion over M_4 , more or less connected with that on Cu ; M also somewhat suffused; costal cell entirely clear, cell R_2 also clear except at base.

Devon (Edge Barton, 6.vi.37, 1 ♂, 4 ♀; landslip near Seaton, 29.v.05, 3 ♂; Bindon Landslip, 22.vi.05, 1 ♂).

The nine specimens examined show only trifling variations among themselves, and at first glance have little in common with *submarmorata*; a connecting link is, however, provided by the var. *bistriata*.

var. **pentasticta** n. (Pl. IV, fig. 6.)

Differs strikingly from all other species and forms of the genus in Britain in the extreme reduction of the wing-markings; to the naked eye only five rather small blackish spots are evident, these being at base of *Rs*, stigma, base of *R*₄₊₅, accessory cross-vein and *m-cu*. Costal cell entirely clear; a very minute spot or darkening over *Sc*₂; sometimes a small dark dot at tip of *R*₁, but tip of other veins clear; humeral cross-vein clear, but dark dots usually present over arculus; no dark streaks on wing.

Arran (Brodick, 1 ♂), Devon (Edge Barton, 5 ♂, 6 ♀; Dowlands landslip, 1 ♀; Seaton, 5 ♂, 1 ♀ in Dale collection, also 2 ♂, 3 ♀ collected by Rev. A. E. Eaton, 29.v.05); Dorset (St. Gabriels, 6 ♂, 1 ♀).

De Meijere (1921) figures a specimen from Denmark, obviously of this form, as *spoliata* Lw.; this determination however is incorrect.* The Dale specimens were labelled *Ephelia aegle* Hal.

Subgenus **LIMNOPHILA** Mcq., s. str.

Syn. *Poecilostola* Schin. (Pl. III, figs. 9 and 10; Pl. IV, figs. 18-20; text-fig. 13, b.)

Since the genotype of *Limnophila* was first designated as *pictipennis* M. (by Westwood, 1840) the nomenclature code requires that the name shall be used in the sense of *Poecilostola* Schin. rather than in Osten-Sacken's sense. The two British species are distinguished from most others of the tribe (apart from *Elaeophila* and *Idioptera*) by their usually conspicuous wing-markings, but this cannot be regarded as a generic or subgeneric distinction. The following combination of other adult features will, however, define the group fairly satisfactorily:

Head narrowed behind, much as in *Pseudolimnophila* (text-fig. 13, b). Pronotum large, somewhat as in *Dactylolabis*; not

* Dr. F. Peus has at my request re-examined the type of *spoliata* and reports that the wing-markings are quite other than in de Meijere's figure; spot 1 is large and extends across basal cells; 3 forms part of a complete band extending from costa to hind margin; 5 also forming part of an irregular band extending over cross-veins; 2 and 4 both absent, vein *Sc*₂ also absent. The antennae are not all black, as stated in Loew's description, but have the base of the flagellum yellowish, as in most species of this subgenus.

produced forwards in front on each side, and without a conspicuous suture between anterior and posterior pronotum. Anterior pits conspicuous. Humeral pits quite large. Abdominal tergites with transverse bare impressed areas, as in *Epiphragma* and *Pseudolimmophila*. Squama and stigma bare. Venation: R_1 continued slightly beyond cross-vein (less so than in *Pseudolimmophila*); R_s long; arculus complete. Hypopygium: outer style stout (except at tip) and hairy; parameres small; penis forming a long, stout, curved tube.

Despite Osten-Sacken's statement to the contrary, there is no noteworthy difference in the structure of the head and prothorax between the two British species.

L. (L.) punctata Schrank. (Pl. IV, figs. 18-20.)

Head, thorax and abdomen blackish, with a very heavy grey or blue-grey pruinescence. Praescutum with four dark brown stripes, lateral pair shortened, median pair sometimes with a fine dark line between them and either running the whole length or (when the blue-grey dusting is very heavy) reduced to a pair of spots at middle. Legs black, femora yellow on basal half or more. Wings normally (Pl. IV, fig. 19) with numerous small spots and dots along the veins and in the cells, some larger ones towards costa; in dark specimens (Pl. IV, fig. 20) these spots are larger and more numerous and may fuse to cover the entire wing; on the other hand, they may be reduced in number (Pl. IV, fig. 18) or even (rarely) entirely absent, leaving the wing clear. Wing 10-13 mm.

Hypopygium: Tergite with a pair of blunt, blackened projections in middle; inner style with a subapical tubercle bearing several curved bristly hairs; coxite without apical process.

Widely spread in England and Scotland. iii-v.

(L. (L.) pictipennis Mg. (Pl. III, figs. 9 and 10.)

Thorax with blue-grey dusting; praescutum with a median brown line and some small dots. Abdomen reddish. Legs yellow, femora and tibiae with black tips. Wings narrower than in *punctata*; markings similar, but blotch below stigma more oblique; in some specimens (perhaps representing Meigen's *angustipennis*; Pl. III, fig. 19) there are no definite markings but the whole wing is suffused with brown. Wing 9-12 mm.

Hypopygium: Tergite without definite projections in middle; inner style without setiferous tubercle; coxite with a thumb-like apical process.

Cambs, Devon, Notts, Somerset, Sussex, Yorks. v-vii.

Subgenus **PSEUDOLIMNOPHILA** Alex.

(Pl. III, fig. 15; text-fig. 13, a.)

This name was first introduced as a subgenus, and later separated generically from *Limnophila*, chiefly on account of well-marked distinctions in the early stages. The adults differ from all other genera and subgenera of the tribe except *Limnophila* s.str. (*Poecilostola*) in the shape of the head, which is rather conspicuously narrowed behind (text-fig. 13, a); and from most in the unusual distinctness of both the anterior pits of the praescutum and the transverse impressions on the abdominal tergites. From *Limnophila* s.str. the present group differs chiefly (and quite markedly) in the form of the pronotum and in various features of the hypopygium. The following additional adult features are common to both the British *Pseudolimnophila* and to most of the exotic species: Antennae short, with short verticils. Pronotum not very large, but produced forwards on each side in front to protect the back of the neck; anterior division separated behind by a deep suture from the posterior pronotum. Squama and stigma bare. Venation: R_1 continued well beyond the cross-vein; R_s long; base of cell R_3 pointed and distinctly proximal to $r-m$; cell M_1 present and fairly long; $m-cu$ before middle of discal cell; arculus complete. Hypopygium: Very similar to that of *Pilaria*, notably as regards form of styles (text-fig. 14, c and d) and parameres; the resemblance to *Limnophila* (*Poecilostola*) is much less close.

L. (Ps.) lucorum Mg. (Pl. III, fig. 15.)

Thorax blackish-grey, praescutum with three rather distinct dark brown stripes, the middle one sometimes divided, pleurae dark greyish. Abdomen blackish. Legs darker or lighter brownish, tips of femora somewhat darkened. Wings unmarked; R_{2+3} rather long, forking at the cross-vein as in *Pilaria*. Wing-length 8.5-10 mm.

Hypopygium: Inner style shorter than outer, moderately thick basally, tapering apically.

Rather common. Kent and Devon to Arran. vi.

L. (Ps.) sepium Verr. (Text-fig. 14, c.)

Thorax dark brownish above, praescutum not distinctly striped; pleurae light reddish brown. Abdomen ^{pale} ~~pale~~ above, ^{dark} ~~dark~~ beneath. Legs rather light brownish. Wings unmarked; R_{2+3} short, forking well before the cross-vein. Wing-length 8.5-10 mm.

Hypopygium: Inner style as long as outer and unusually slender.

Local. Carnarvon, Cornwall, Gos., Hants, Isle of Wight, Notts, Oxon, Salop, Somerset, Waterford. vi.

Subgenus **PILARIA** Sintonis.Syn. *Eulimnophila* Alex.

A. THE TYPICAL SPECIES.

(Pl. III, figs. 11 and 21; text-figs. 12, a; 13, c; 14, d.)

This genus was originally founded chiefly on the long antennal verticils, but this character is of little importance, as *L. scutellata* Staeg., which has short verticils, is undoubtedly closely related to the other species. Similarly the lack of cell M_1 in the wing of the genotype is of no great significance. Nevertheless the group can be readily defined by the following combination of characters:—

Head rounded (not narrowed behind as in *Limnophila* and *Pseudolimnophila*). Pronotum small. Anterior pits present but small; humeral pits large and placed well forwards. Abdominal tergites without shining transverse impressed areas. Venation: R_1 continued well beyond the cross-vein; R_s always long; R_{2+3} (at least in all the British species) forking almost at the cross-vein; base of R_{4+5} almost vertical and almost in line with $r-m$, so that cell R_3 is somewhat square at base. Squama (in all the British and in most exotic species) with a group of stiff hairs (text-fig. 12, a) (this feature distinguishing *Pilaria* from all other genera or subgenera of the tribe in Britain except *Epiphragma*). Stigma usually more or less hairy (another peculiarity of *Pilaria*, which, however, is not found in all specimens of *meridiana*). Hypopygium: outer style bare, slender, tapering and pointed; inner style hairy as usual, tapering and somewhat pointed, with one or two stiff hairs at extreme tip; both very much as in *Pseudolimnophila* (compare text-fig. 14, c and d); the single pair of parameres definitely dorsal to the penis and of characteristic shape, being divided from the base into two curved, pointed arms.

L. (P.) discicollis Mg. (Pl. III, fig. 11.)

Head dark grey. Antennae short (σ ♀) with very long verticils. Thorax somewhat shining, dark brown above, uniformly bright ochreous on pleurae and usually also on shoulders. Abdomen dark brown above, lighter beneath. Legs brown, femora indefinitely darker towards tips. Wings brownish, stigma scarcely darker, cross-veins clear. Cell M_1 usually about as long as its stem. Wing 10-12 mm.

Ponds and marshes, common. Sussex and Devon to Sutherland. vi-viii.

In some specimens (from several widely separated localities in Suffolk, Oxford and Somerset) the dark colour of the mesonotum extends right to the margin of the praescutum, even on the shoulders; such specimens also seem to have the meso-

notum more dusted, the pleurae less clear ochreous, the ninth tergite of the male slightly more hairy than usual, and the verticils of the antennae somewhat shorter. The name *decolor* Zett. is available for this form, in case it should be shown to be distinct, but the characters are not very definite.

L. (P.) fuscipennis Mg.

Much resembles *discicollis*, but rather smaller and much paler, thorax scarcely darker dorsally than on sides; abdomen lighter; wings with a less evident brown tint and slightly more obvious stigma. Legs light brown, femora scarcely darkened apically. Wing-length 9-10 mm.

Hypopygium differing from *discicollis* in the more regularly tapering penis.

Hants (New Forest), Sussex (Frant). vi-vii.

L. (P.) scutellata Staeg.

Syn. *subtincta* Zett. (teste Nielsen).

Differs from the other three species in having the antennae less slender, with much shorter verticils, which are scarcely twice the length of the segments instead of four or more times as long. Thorax dark brownish, including most of pleurae; a small light area on shoulders; whole surface considerably dusted; praescutum indistinctly striped. Legs light brown, tips of femora rather abruptly darker. Wings with a general brown tinge and with slight but obvious dark clouds on stigma, cross-veins and base of Rs. Venation much as in *discicollis*. Wing-length 9-11 mm.

Hypopygium hardly differing from *discicollis*.

Kirkcudbright, Morayshire (Forres), Salop (Whixall), Somerset (Bridgwater), Sussex (Lewes). vi-vii.

L. (P.) meridiana Staeg. (Pl. III, fig. 21.)

Syn. *philicornis* Zett.

Head black, shining above antennae, elsewhere with thin dusting. Antennae with long verticils as in *discicollis*. Thorax blackish above, pleurae largely ochreous but with a broad blackish stripe from neck to base of abdomen; mesonotum slightly dusted. Abdomen blackish. Legs dark. Wings slightly brownish, unmarked. Venation much as in the other three species, but cell M_1 absent. Wing-length 6-8 mm.

Hypopygium similar to *discicollis*, but penis short, thick, and spinose at tip.

Glasgow (Possil), Inverness (Nethy Bridge), Norfolk (Horning Ferry), Salop (Whixall), Stirlingshire (Buchlyrie). vii-viii.

In addition to the more or less typical species of *Pilaria* just dealt with, two other small groups of species are included here for want of a better place. They are probably worthy of recognition as separate subgenera, but for the present at least I am reluctant to propose names for them.

B. THE NEMORALIS GROUP.

(Pl. III, figs. 16 and 17.)

Limnophila nemoralis Mg. and the very closely related *L. adjuncta* Walk. are very similar to *Pilaria* in venation, notably in having vein R_1 continued well beyond the cross-vein, and the basal portion of R_{4+5} nearly vertical, so that cell R_3 is squarish at the base; they differ from *Pilaria* in having the humeral pits quite small and the hypopygium quite different, the slender, bare outer style being bifid at the tip and the aedeagus more resembling that of *Elaeophila*; the squama lacks the hairs which are present in nearly all true *Pilaria* species.

L. (P. ?) *nemoralis* Mg. (Pl. III, fig. 17.)

A medium-sized to small species without definite markings; body rather dark brown, thorax more or less heavily dusted with grey; legs light brownish; wings clear, with only the stigma faintly darkened. Venation somewhat variable, especially as regards shape of discal cell and length of cell M_1 ; the latter is usually about half as long as its stem, but may be shorter or even occasionally absent. Wing-length variable, 4.5-9 mm., normally about 7 mm.

Hypopygium: Coxites long, pale in colour; outer style long and slender, bifid at the tip, the inner tooth larger than the outer, quite bare, even at base; outer parameres thumb-like, somewhat clubbed at tip; inner parameres curved and pointed, as long as outer pair.

This common species occurs in three or four forms (apart from *adjuncta*, which I formerly included as a fifth variety, but now admit as a distinct species). These forms appear identical structurally but are rather well marked, though not quite as obviously distinct as *L. phaeostigma* and its allies.

var. *nemoralis* Mg. (typical form).

Antennae yellowish at base. Thorax bluish-grey. Abdomen brownish or brownish-ochreous. Stigma faint, two-thirds of it beyond the cross-vein. The upper of the two veins closing discal cell somewhat curved. Wing-length 6-8 mm.

Common in the south of England.

var. **minuscula** Edw.

Antennae yellowish at base. Thorax light grey. Abdomen light brownish. Stigma indistinguishable. Both veinlets closing discal cell quite straight. Wing-length 4.5-6 mm.

Herts (Knebworth, Bushy).

var. **separata** Walk.

Syn. *collina* Edw.

Antennae entirely blackish or dark brown. Thorax dark brownish-grey. Abdomen blackish. Stigma faint, about equally bisected by the cross-vein. Discal cell as usual nearly twice as long as broad, with the upper of the two veinlets closing it somewhat curved and the cross-vein near its middle. Wing-length 7-9 mm.

Chiefly in hilly districts; common in Scotland and north and west of England and Wales. Walker's type of *separata* from Finland agrees well with Scottish specimens. This form is possibly to be regarded as specifically distinct from *nemoralis*.

var. **quadrata** Edw.

Resembles var. *separata* except that the discal cell is smaller, being little if at all longer than broad, with *m-cu* at or close to its base.

Several specimens from various localities in Scotland. These specimens perhaps represent mere individual aberrations rather than a definite variety.

L. (P.?) adjuncta Walk. (Pl. III, fig. 16.)

Syn. *nemoralis* var. *noscibilis* Edw., *dimidiata* de Meij.

Very similar to *nemoralis*, differing mainly in wing-markings and venation; stigma brown and quite conspicuous; slight brown seams along cord and at base of *Rs*; cell M_1 constantly about equal in length to its stem. Wing-length 7-9 mm.

Hypopygium apparently indistinguishable from *nemoralis*.

Rather common. Arran, Devon, Hants, Kerry, Norfolk, Notts, Salop, Somerset. v-vi.

A specimen in the British Museum collected by Dale has a cross-vein in the lower basal cell.

C. THE FILATA GROUP.

(Pl. III, fig. 19.)

Limnophila filata Walk. and the closely related *L. leucophaea* (Mg.) de Meij. occupy rather an isolated position and will not fit readily into any of the known subgenera of *Limnophila*. They have a wing-venation similar to that of *Pilaria* and

the *L. nemoralis* group, with R_1 continued well beyond the cross-vein (though in these two species r is very faint or even absent) and the basal section of R_{4+5} nearly vertical; they further agree with the *L. nemoralis* group in having R_{2+3} forking well before the cross-vein, cell M_1 short or even absent, and the squama bare, but the humeral pits are large, as in *Pilaria*, *Phylidorea*, etc. A very peculiar feature is that the anterior pits are large and confluent, forming a shining patch on the front of the mesonotum (as noted by Verrall in his redescription of *filata*). The hypopygium is also rather peculiar, the outer style being hairy on its outer margin; the basal parts are but little developed and the parameres very small.

L. (P.?) filata Walk. (Pl. III, fig. 19.)

A small blackish species. Head dark ash-grey. Thorax with heavy grey dusting; praescutum with three obscurely darker stripes. Legs blackish; coxae dark brown, grey-dusted. Wings with cell M_1 very short, at most half as long as its stem, usually shorter, and very often absent on one or both wings. Wing-length 5-6.5 mm.

Hypopygium: Penis rather stout, parameres sharply pointed. Bogs. Sussex and Devon to Sutherland. v-vi.

L. (P.?) batava nom. n.

Syn. *leucophaea* de Meij., nec Mg.

Larger than *filata*. Head more brownish-grey than ash-grey. Thorax light to dark brownish, praescutum at most with an ill-defined median darker stripe. Anterior pits not quite so large as in *filata* and not always confluent. Legs brownish, coxae yellowish. Abdomen usually darker than thorax. Wings with slight yellowish instead of dark grey tinge; venation differing from *filata* as follows: Sc_2 at extreme tip of Sc (instead of about its own length distant from tip); R_{2+3} longer, about half as long as R_2 (fork of R_{2+3} therefore conspicuously shorter than in *nemoralis*); r extremely faint, in most specimens not traceable at all; cell M_1 about as long as its stem or even slightly longer; *m-cu* beyond instead of before middle of discal cell. Wing-length 7-9 mm.

Hypopygium much as in *filata*, with slight differences chiefly in shape of parameres, which are rounded at tips; penis more slender.

Beds (Barton), Morayshire (Nairn), Notts, Wexford, Yorks. vi-vii.

The venation of this species (as described above) is very distinctive; the virtual absence of cross-vein r will separate it from all other British Hexatomini except the species of *Oxydiscus*.

Meigen's description of *leucophaea* indicates a specimen with the venation of *nemoralis*, and with grey thorax and yellowish abdomen; the specimen in his collection in Paris answers to his description and is perhaps a variant of *nemoralis* (Sc_2 well removed from tip of Sc , cell M_1 quite short, etc.). De Meijere's determination of *leucophaea* is therefore incorrect, and I rename his species as above.

OXYDISCUS de Meij.

Syn. *Adelphomyia* auct. nec Bergroth, *Gonomyiella* Kuntze.

(Pl. III, fig. 22; text-fig. 16.)

This genus differs from all other British Hexatomini in the presence of hairs on the membrane in the apical cells of the wing, in the absence or extreme faintness of cross-vein r , and in the presence of at most a single minute spur on each tibia. The character of the wing-pubesence is not diagnostic, as it is shared by certain subgenera of *Limnophila* (*Ulomorpha*, *Lasiomastix*, *Adelphomyia* = *Tricholimnophila*). The absence of cross-vein r in most specimens has sometimes led to confusion with the genus *Gonomyia* and is to be noted also in the genus *Phyllobasis*; in those specimens in which this cross-vein is faintly traceable it may occur at the fork of R_{2+3} or on R_2 near its base. The cell R_2 is rather characteristically widened. The small tibial spurs may be present or absent in closely allied species, and perhaps even in individuals of the same species, though the variability in this respect which has been attributed to *senilis* and *fuscula* may have been owing to confusion of allied species or to insufficiently close observation. Species or specimens in which the spurs are absent might well be mistaken for Eriopterini.

A further feature (not heretofore noted) distinguishing *Oxydiscus* from other Hexatomini is that the anterior pits of the praescutum are placed well back from the front margin, while the small numeral pits are rather far forward, so that the former are only slightly in front of the latter. This seems to be true of all species of the genus (exotic as well as British).

The hypopygium also shows some peculiarities. The ninth segment forms a continuous ring as in other Hexatomini, but the longitudinal suture is mid-dorsal instead of mid-ventral, which is perhaps a fundamental difference, and the ventral portion of the ring is wider than the dorsal. (This is not due to inversion of the hypopygium, as I at first thought possible.) The outer style is of characteristic shape, with three terminal teeth, of which the longest is on the inner margin; this same structure is seen in the Javanese genotype of *Oxydiscus*. Good specific characters are to be found in the aedeagus, especially the form of the chitinisation at the base of and ventral to the penis, which in three of the four British species is developed

into a pair of long pointed processes. In the British species the coxite is simple, but in some American species (*americana* Alex., *minuta* Alex.) it is produced into a longish process somewhat suggestive of *Gonomyia*.

Species of this genus have sometimes been regarded (by Haliday on account of an error regarding the number of antennal segments, by Alexander on account of certain resemblances in the larvae) as belonging to the *Pediciini*.

The name *Adelphomyia* has been consistently applied to this genus for the past twenty years and more, but a review of the literature shows that this usage is inadmissible. Bergroth in introducing the genus *Adelphomyia* (1891) described only one species, *A. helvetica*, and this was apparently the only species then known to him, although he also mentioned *senilis* Hal. as belonging to the genus; later (1913) he definitely cited *helvetica* as the genotype. Unfortunately Bergroth's description of *helvetica* leaves no room for doubt that his name is a synonym of *Limnophila punctum* Mg., and Meigen's species is certainly not congeneric with *senilis* but has most of the characters of the second section of the subgenus *Phylidorea* (see p. 74).

KEY TO BRITISH SPECIES OF OXYDISCUS.

1. Wings hairy on distal third; $2a$ longer 2.
Wings hairy only at extreme tip; $2a$ shorter *nielseni* Kuntze.
2. Dark species; scutellum dark brown like praescutum *senilis* Hal.
Not so dark; scutellum and pronotum pale 3.
3. Thorax mainly reddish; R_{2+3} over half as long as R_2 *fuscata* Lw.
Mesonotum darkened; R_{2+3} not half as long as R_2 *ecalcarata* Edw.

O. senilis (Hal.) Edw. (Text-fig. 16, a; pl. III, fig. 22.)

Syn. ? *philipennis* Strobl.

Mesonotum dark brown, sometimes indistinctly reddish-tinted, somewhat shining when seen from above, slightly brown-dusted when seen from in front; scutellum as dark as remainder of mesonotum. Pronotum mainly dark, its posterior division (with humeral angles) dull yellowish. Pleurae with a broad but ill-defined dark brown stripe above extending from pronotum to base of abdomen, dull yellowish in middle, and with a large dark brown patch on lower part of sternopleura. Abdomen blackish, hypopygium reddish-brown but not conspicuously pale. Spur formula of tibiae 0-1-1 in all specimens examined (about a dozen). Wings moderately broad and somewhat smoky, rather densely hairy on distal third, usually with some hairs in marginal cell above R_{2+3} and in upper basal cell; both anal veins hairy for the greater part of their length. R_{2+3} less than half as long as R_2 , the darkening of the stigma beginning almost exactly at the fork. Cell M_1 usually about one-third

as long as its stem, sometimes longer or shorter but always present. 2A reaching beyond level of base of Rs. Wing 5-6 mm.

Hypopygium: Parameres short and broad; tips bent; penis rather short and broad; forked ventral piece of aedeagus of moderate length; outer style with the inner tooth hardly longer than the middle one.

The commonest species of the genus in Britain. Specimens in the British Museum are from Denbigh, Devon, Hants, Hereford, Herts, Inverness, Kent, Merioneth; also Algeria.

I follow the restriction of this species I made in 1926, though not without some hesitation, as Haliday describes the antennae as 'dingy ferruginous at the base,' whereas in all the four British species known to me they are entirely blackish; moreover Haliday's description of the thorax as 'lurida' and 'dark reddish grist-colour' might perhaps apply better to *fuscula*.

Lackschewitz (MS., 1934) proposed to revive Meigen's name *nitidicollis* for this species, on the strength of five males so determined in Vienna; however Meigen's type was a female in his own collection, and his description of the pleurae as yellow and the trochanters as black seems to exclude this species. The types of both *senilis* and *nitidicollis* are lost.

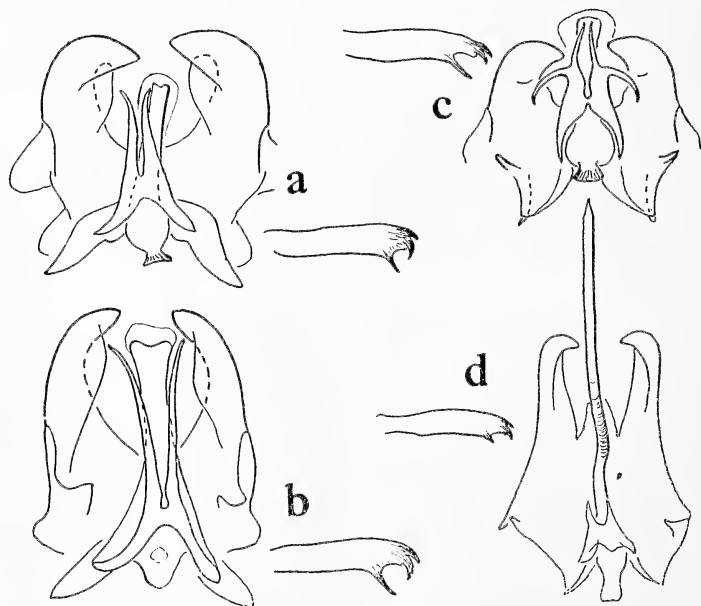


FIG. 16.

Aedeagus (from beneath) and outer style of *Oxydiscus*: a, *senilis*; b, *fuscus*; c, *ealcaratus*; d, *nielseni*.

O. fuscus (Lw.) Edw. (Text-fig. 16, b.)Syn. *Gonomyia furcata* Kuntze.

Thorax much lighter than in *senilis*; mesonotum almost uniformly light reddish-brown; pronotum yellowish except in front; dark stripe on upper part of pleurae indistinct and sternopleura almost entirely yellowish. Hypopygium rather conspicuously paler than rest of abdomen. Tibial spurs as in *senilis*, 0-1-1 in all specimens examined (half a dozen). Wings clearer than in *senilis* and slightly less hairy, usually no hairs in marginal cell above R_{2+3} and few or none in upper basal cell; anal veins setose as in *senilis*. R_{2+3} at least half as long as R_2 , often more, the slight darkening of the stigma usually beginning well before the fork. Cell M_1 and vein $2A$ as in *senilis*. Wing-length 4-5 mm.

Hypopygium: All parts of aedeagus longer than in *senilis*, this being particularly noticeable in the ventral fork; parameres straighter; outer style with the internal tooth rather longer.

More local in Britain than *senilis*. British Museum specimens are from Arran (Catacol), Morayshire (Elgin), Sussex (Crowborough), Yorks (Whitby).

The determination of this species might be questioned, as both Loew in his original description and Nielsen (1919) state that tibial spurs are absent. However Osten-Sacken recorded that he saw spurs in two specimens in Loew's collection, and I find minute spurs to be present in specimens sent me by Nielsen from Ry, Denmark (the type locality of *furcata*, = *fuscus* of Nielsen). Moreover Dr. Delkeskamp has kindly lent me for study one of the two specimens (♀) in the Loew collection; this possesses small spurs (0-1-1) and agrees with British specimens in all the points noted above, though the hairs on the wings are rather more numerous and the dark markings on pleurae more distinct. The determination as above may therefore be regarded as correct.

*** O. ecalcaratus** sp. n. (Text-fig. 16, c.)

Thorax with praescutum and scutum almost uniformly brown (not nearly as dark as in *senilis*) and somewhat shining, but scutellum pale and pronotum (except in front) rather conspicuously yellow; dark upper stripe on pleurae fairly obvious but spot on lower part of sternopleura not well marked. Hypopygium conspicuously pale. Tibial spurs entirely absent in all three specimens examined. Wings nearly clear, venation much as in *senilis*, R_{2+3} not or scarcely half as long as R_2 . Wing-length about 5 mm.

Hypopygium: All parts of aedeagus short, ventral fork remarkably different from that of the two preceding species, with a curved outer arm about mid-length of each prong; outer style with the two terminal teeth small.

Denbigh (Llangollen, 2 ♂, including type), N. Devon (Brendon, 1 ♂).

It is not impossible that Loew had specimens of this species (possibly together with others) in his series of *fuscus*.

O. nielsenii Kuntze. (Text-fig. 16, d.)

Thorax rather light reddish-brown, much as in *fuscus*. Tibial spurs 0-1-1 in four specimens examined. Wings narrower than in the other species, without obvious anal angle; hairs on membrane scanty, confined to extreme tip, none in cells M_4 or Cu ; both anal veins bare. Cell M_1 very short, not infrequently absent. Vein 2A shorter than in the other species, ending before level of base of Rs . Wing-length 3.5-4 mm.

Hypopygium: Penis very long, slender, sinuous, about twice as long as the rather long parameres; ventral fork rudimentary or absent; outer style with tooth on inner margin short.

Dorset, Dumbarton, Montgomery, Morayshire, Salop, Sussex. viii-ix.

ERIOPTERINI.

In this tribe are included all the genera of crane-flies occurring in Britain which lack tibial spurs but possess two submarginal cells in the wing, the latter character distinguishing members of the tribe from the Limoniini, which also lack tibial spurs but have only one submarginal cell. (Some exotic genera and species of Eriopterini possess only one submarginal cell, but these do not concern us here.)

The majority of the genera and subgenera of Eriopterini belong to a compact subtribe, the Eriopteraria, the characters of which are noted under the subgenus *Erioptera* (p. 120); the remaining genera are more or less unrelated, and are only included in the Eriopterini for convenience, through possessing the two main tribal characters.

The two genera placed first (*Neolimnophila* and *Crypteria*) are nearly related to the North American and East Asian *Cladura*, these genera resembling Hexatomini and differing from all other Eriopterini in Britain in several features of venation, especially the preservation of cell M_1 . The wingless snow-flies (genus *Chionea*), which have not as yet been found in Britain but may possibly occur in Scotland, belong to the same group.

Lipsothrix, with its strongly toothed claws suggestive of the Limoniini, occupies an isolated position. *Gonomyia* is in some ways reminiscent of the Pediciini, especially *Dicranota*. *Gnophomyia* and *Rhabdomastix* are of uncertain affinities, but perhaps more nearly connected with the Eriopteraria.

Most Eriopterini are of small size and often hairy. The typical forms, as contrasted with Hexatomini, have cell M_1 absent; Sc_2 well before tip of Sc ; microtrichia of wing-membrane fine; ninth tergite and sternite of ♂ almost separate at sides.

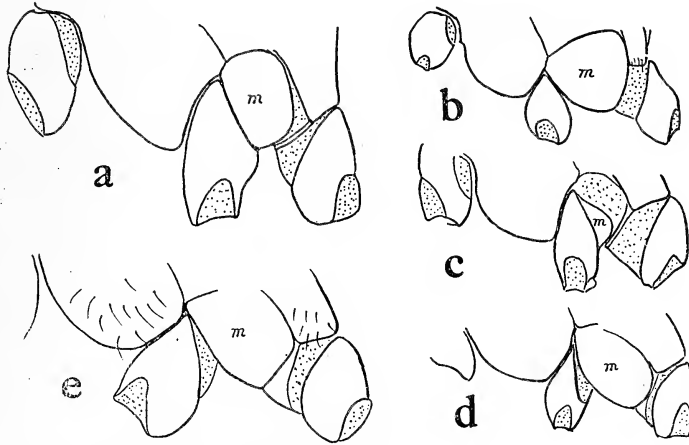


FIG. 17.

Lower part of pleurae, with middle and hind coxae, of Eriopterine genera, to show size of meron (m). Membranous areas stippled. a, *Neolimnophila*; b, *Crypteria*; c, *Gonomyia*; d, *Rhabdomastix*; e, *Erioptera*.

KEY TO BRITISH GENERA AND SUBGENERA OF ERIOPTERINI.

1. Five posterior cells (cell M_1 present) 2.
- Four posterior cells (cell M_1 absent) 4.
2. Antennae normal; wing-membrane hairy at tip
[*Oxydiscus*, tribe Hexatomini].
- Antennae with first few segments of flagellum fused into a large conical segment; wing-membrane bare (*Claduraria*) 3.
3. κ_{2+3} and R_2 subequal in length; meron small (text-fig. 17, a) *Neolimnophila* Alex.
- R_{2+3} much less than half as long as R_2 ; meron large (text-fig. 17, b) *Crypteria* Berg.
4. Middle and hind coxae close together, meron small (except in *Rhabdomastix*); wing-membrane without macrotrichia, veins not conspicuously hairy; anterior pits of praescutum near front margin or absent 5.
- Middle and hind coxae rather widely separated, meron large (fig. 17, e); anterior pits of praescutum placed rather far back (except in *Scleroprocta*, which has the wing-membrane hairy); r always present (*Eriopteraria*) 11.
5. Radial fork long, r present; anterior pits absent 6.
- Radial fork short, r absent; anterior pits present near front margin .. 7.
6. $r-m$ well beyond fork of R_3 ; r close to tip of R_1 *Lipsothrix* Lw.
- $r-m$ at fork of R_3 ; r far before tip of R_1 *Gonophomyia* O.-S.

7. Mid and hind coxae close together, meron small (text-fig. 17, c); *ax* markedly proximal to base of *Cu P* (text-fig. 19, a) (*Gonomyia* sens. lat.) 8.
 Mid and hind coxae separated, meron large (text-fig. 17, d); *ax* not or scarcely proximal to base of *Cu P* (text-fig. 21, a) *Rhabdomastix* Skuse.
8. Lower basal cell much shorter than upper; discal cell open *Idiocera* Dale.
- Basal cells of equal length 9.
9. R_2 moderately long, almost continuing direction of R_{2+3} ; discal cell open or closed *Ellipteroides* Beck.
 R_2 shorter, at an angle with R_{2+3} ; discal cell closed 10.
10. R_2 oblique, R_s moderately long *Gonomyia* Mg.
 R_2 very short and vertical, R_s very short *Lipophleps* Bergr.
11. R_s ending in second submarginal cell (normal); *m-cu* beyond middle of wing (usually well beyond) 12.
 R_s ending in first submarginal cell; *m-cu* near or even before middle of wing; veins with long dense hair 22.
12. Wing-membrane bare 13.
 Wing-membrane hairy (*Ormosia* sens. lat.) 20.
13. R_{2+3} long, *r* well before the fork (*Cheilotrichia* sens. lat.) 14.
 R_{2+3} short, *r* on R_2 beyond the fork (*Erioptera* sens. lat.) 16.
14. R_2 very short, straight, divergent from R_3 *Gonempeda* Alex.
 R_2 longer, looping parallel with R_3 15.
15. Pteropleura with hairs (pale yellow species) *Cheilotrichia* Rossi.
 Pteropleura bare (grey species) *Empeda* O.-S.
16. *2a* long and sinuous 17.
2a short and nearly straight 18.
17. Veins usually obviously hairy; discal cell usually open ... *Erioptera* Mg.
 Veins nearly bare; discal cell closed; *2a* more strongly sinuous *Symplecta* Mg.
18. Veins very hairy; hypopygium inverted *Ilisia* Rond.
 Veins less hairy; hypopygium not inverted 19.
19. Last three antennal segments not noticeably smaller .. *Psiloconopa* Zett.
 Last three antennal segments rather abruptly smaller ... *Trimicra* O.-S.
20. *2a* long and sinuous, as in *Erioptera* *Rhypholophus* Kol.
2a shorter and nearly straight 21.
21. Postnotum bare; discal cell present (closed) *Scleroprocta* n.subg.
 Postnotum with soft hairs; discal cell usually absent (confluent with third posterior) *Ormosia* Rond.
22. Postnotum and wing-membrane bare *Molophilus* Curt.
 Postnotum with patches of long hairs; wing-membrane hairy; whole body very densely hairy *Dasymolophilus* Tonn.

NEOLIMNOPHILA Alex.

(Pl. V, fig. 3; text-figs. 17, 18.)

Readily distinguished from all other British Eriopterini except *Crypteria*, and from all British Hexatomini except *Hexatoma*, by the reduction in the number of antennal segments, the first three (?) segments of the flagellum being fused completely into one large conical segment; beyond this fusion-segment it is difficult to count the remaining slender, cylindrical segments in the dry specimen; there are normally eleven of these, but the number may not be constant. Further features distinguishing *Neolimnophila* from *Crypteria* are: Anterior pits of mesonotum

present though small. Meron quite small, the middle and hind coxae therefore close together (text-fig. 17, a). Wings of ♂ scarcely broader than those of ♀. Microtrichia of membrane coarse, very distinct under a magnification of 100 (as in Hexatomini). Sc_2 at extreme tip of Sc . Radial fork short, R_2 alone not or scarcely longer than R_{2+3} , r rather faint but apparently always traceable, placed near base of fork. Coxite of ♂ hypopygium without false joint and with a peculiar strong spine at basal root.

N. carteri Tonn. (Pl. V, fig. 3; text-fig. 18, a.)

Dark brown; legs brownish; wings quite clear. Thorax rather heavily dusted with grey; praescutum without dark stripes. Veins in distal fourth of wing with obvious short hairs. Cross-vein r on R_2 , usually well beyond the fork. Wing-length 7-9 mm.

Hypopygium: Coxite with only the one large spine at base; outer style rather slender throughout; parameres very broad and truncate.

Flintshire (Ffrith), Lanarkshire (Gorge of Avon), Lancs (Manchester, Denton, Astley Bridge, Clayton-le-Dale), Midlothian (Polton), Salop (Snailbeach), Westmorland (Windermere), Yorks (Gormire). v-vii.

N. placida Mg. (Text-fig. 18, b.)

Syn. ? *ultima* I.-S., *hyalipennis* Zett.

Differs from *carteri* in having a pair of dark stripes on praescutum; hair on veins towards wing-tip very short and inconspicuous; r just at fork of R_{2+3} , or on R_{2+3} before the fork.

Hypopygium: Coxite with a second small spine at base, more ventrally placed than the large spine; outer style stout towards base; parameres not so broad as in *carteri*, with outwardly directed point.

Hereford (Calnwood), Herts (Welwyn), Notts (Sherwood Forest), Yorks (Allerthorpe). vii-ix.

The third European species (*bergrothi* Kuntze) may also occur in Britain. It has the venation of *carteri*, but differs from both our species in having the outer style straight and pointed, not hooked at tip.

CRYPTERIA Bergr.

(Text-figs. 1, 17.)

Antennae similar to those of *Neolimnophila*, from which genus *Crypteria* differs as follows: Only nine slender segments beyond the fusion segment of antennal flagellum (this number

perhaps not constant). Anterior pits of mesonotum absent. Meron large, the middle and hind coxae therefore well separated (text-fig. 17, b). Wing of ♂ broad in middle, that of ♀ narrower, much as in *Elaeophila*. Microtrichia of membrane very fine, invisible under a magnification of 100. Sc_2 well removed from tip of Sc . Radial fork long, R_2 nearly three times as long as R_{2+3} ; r usually absent, but present in some specimens and then situated almost at mid length of R_2 . Coxite of ♂ hypopygium with a false joint beyond middle, and without spine at basal root.

C. *limnophiloides* Bergr.

Brown or dark grey; pleurae and venter often more reddish; legs brown; wings clear; thorax unmarked. Wing-length 5.6-5 mm.

Argyll, Cheshire, Glamorgan, Glos., Herts, Notts, Ross, Salop, Yorks. viii-x.

LIPSOTHRIX Lw.

(Pl. V, fig. 2; text-fig. 18, c-e.)

Venation very similar to that of *Limnophila* (*Phylidorea*) except for the absence of cell M_1 ; Sc_2 close to tip of Sc ; r on R_2 well beyond the fork and close to tip of R_1 ; $r-m$ well beyond base of R_{4+5} , which is curved; $m-cu$ variable in position, usually close to base of discal cell. *Lipsothrix* differs from the other genera of both Hexatomini and Eriopterini in having the claws strongly toothed; apart from this it may of course be distinguished from *Limnophila* and other Hexatomini by the complete absence of tibial spurs.

In all five British species the general structure of the hypopygium is the same: tergite simple, without processes; sternite not separated from tergite at sides, but largely membranous and widely interrupted in middle; dorsal style black, bare, pointed, with one sharp tooth; ventral style pale and hairy; parameres long and slender.

KEY TO EUROPEAN SPECIES OF LIPSOTHRIX.

1. Entirely yellow, including tips of femora *remota* Walk.
At least tips of femora black 2.
2. Pleurae with an oblique black stripe, praescutum with three black stripes
in ♀ *nobilis* Lw. (not British).
Pleurae entirely yellow 3.
3. Wings entirely clear, thorax all yellow (♂ ♀); vein 2a hairy at tip ... 4.
Wing-stigma distinct 5.
4. Abdomen with traces of median dark stripe *errans* Walk.
No trace of such stripe *ecucullata* sp.n.
5. Stigma black; vein 2a bare; ♂ antennae short *nigristigma* sp.n.
Stigma grey; vein 2a hairy; ♂ antennae long *nervosa* sp.n.

L. remota Walk. (Pl. V, fig. 2; text-fig. 18, e.)Syn. *ignota* Walk., *clara* Tonn.

Pale yellow, including antennae, legs, halteres and hypopygium; only the terminal palpal and tarsal segments blackish and eighth sternite of ♂ usually black at base; tips of tibiae also slightly darkened but femora wholly yellow. Antennae alike in the two sexes, slender, not or scarcely longer than thorax. Wings clear; veins all pale yellow; no stigma. Hair on wing-veins very short and inconspicuous; 1A with only a few hairs at tip; 2A bare, only very slightly curved. Wing-length 8-10 mm.

Hypopygium: Penis with a strong double bend, its tip directed upwards and slightly backwards, a flattened expansion beneath between the bends; parameres rather evenly curved and tapering to a sharp point.

Locally common. Isle of Wight and Beds. to Devon and Sutherland (no records from E. and S.E. England). v-vii.

In one male (one of Walker's two specimens of *remota*) the abdomen is extensively blackish at the sides for its whole length.

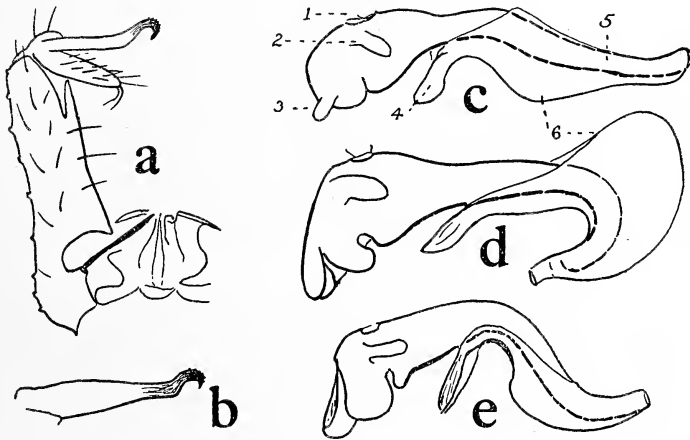


FIG. 18.

a, *Neolimnophila carteri*, hypopygium from above. b, *N. placida*, outer style. c-e, Aedeagus of *Lipsothrix* in side view, parameres and lateral apodemes of vesica removed. c, *ecucullata*; d, *errans*; e, *remota*. 1, Aperture of entry of *vas deferens* to vesica; 2, base of lateral apodeme; 3, median apodeme of vesica; 4, point of attachment of ninth sternite; 5, ejaculatory duct; 6, penis sheath.

L. errans Walk. (Text-fig. 18, d.)Syn. ?*icterica* Egg.

Pale yellow, but with tips of femora conspicuously black, tibiae also narrowly black at base; palpi mainly blackish; abdo-

men in ♂ with distal part of seventh and whole of eighth sternite black; abdomen in both sexes with more or less evident traces of a complete median dorsal dark stripe. Antennae rather less slender than in *remota*, but not longer. Wings clear, veins not so pale as in *remota*, and with rather more obvious hair; 1A hairy on distal half; 2A with rather numerous hairs towards tip, slightly curved as in *remota*.

Hypopygium: Penis reflexed *downwards* and forwards, with a large cowl-like flattened expansion *above*; parameres bent at middle, tapering less gradually than in *remota*.

Argyll (Kilmun), Merioneth (Dolgelley), Perthshire (Glen Lochay, Loch Rannoch). vi.

Mr. P. Nielsen has submitted to me a male and a series of females from Denmark, which agree with British specimens.

Walker's type female is in fair preservation and shows the dark abdominal stripe. A phrase in Schiner's description of *icterica* referring to the hypopygium, 'des unpaarige Mittelstück ragt unten etwas vor,' seems to indicate this species rather than *ecucullata*.

* **L. ecucullata** sp. n. (Text-fig. 18, c.)

Pale yellow; femora with conspicuous black tips and tibiae narrowly black at base as in *errans*, but abdomen in both sexes wholly pale yellow as in *remota*, without trace of median dark stripe and with all sternites yellow (or with eighth sternite only somewhat darkened in ♂). Antennae as in *errans*. Wings as in *errans*, except that 2A is more strongly curved downwards at tip, and with rather fewer hairs (3-6).

Hypopygium: Penis nearly straight and directed backwards, with a slight expansion beneath in middle; parameres evenly tapering but somewhat bent at middle.

Sutherland (Inveran), a single ♂ (type) taken by Verrall, 15.vii.1886, in company with *remota*.

Mr. Peder Nielsen has submitted to me 2 ♂ and 2 ♀ of this species taken at Silkeborg and Rudstrup, Denmark; these agree quite closely with the Scottish type, confirming the distinctions of the species from *remota* and *errans*, both of which also occur in Denmark.

* **L. nigristigma** sp. n.

Head dark (shrivelled in the single specimen available); antennae scarcely as long as thorax, entirely dark, including scape; palpi black. Thorax with yellowish ground colour, but praescutum with three broad sub-confluent blackish stripes, scutum largely black, scutellum and postnotum brown (no markings on pleurae). Abdomen with tergites 1 and 2 mainly blackish, 3-6 with blackish posterior bands, 7-8 and hypopygium blackish. Legs with black knees as in *errans*. Wings with stigma blackish-

brown, very conspicuous and sharply defined; slight brownish clouds over cross-veins; vein 2*A* bare (only 1 or 2 macrotrichia at tip).

Hypopygium: Penis reflexed *upwards*, somewhat as in *remota*, but with a larger flattened expansion beneath; parameres bent near middle.

Lancashire (Clayton-le-Dale), 1.vi.1924. A single ♂ (H. Britten).

In many respects this must resemble *L. nobilis* Lw., but can hardly be that species because Loew's type (a unique ♀) has three sharply defined black mesonotal stripes, an oblique black stripe on the pleurae, and the lower part of the pleurotergite black (characters confirmed by Dr. Peus, who has re-examined the type).

* *L. nervosa* sp. n.

♂. Differs from the other four species in its elongate antennae, which are fully twice as long as the thorax instead of only about the same length; flagellar segments rather stout, fusiform, with long dense pubescence on sides and beneath and a few bristly hairs above near middle.

Head mainly dark; antennae blackish, second and third segments more or less pale; palpi black. Thorax rather brightly shining; pronotum black, praescutum with a broad but not very sharply defined central black stripe, scutum, scutellum and postnotum mainly blackish, sides of praescutum brownish-yellow, pleurae entirely yellow. Abdomen mainly black above, tergites sometimes indistinctly yellowish towards base, mainly yellow below. Legs slender, yellowish, femora with black tips. Wings with a rather strong greyish tinge, all veins still darker and therefore conspicuous; stigma rather dark grey (but usually not much darker than ground colour of wing). Halteres blackish except base of stem. Hair on veins conspicuous; both 1*A* and 2*A* hairy for the greater part of their length.

♀. Antennae not longer than thorax and not conspicuously pubescent, resembling those of the other species.

Colouring much paler than in ♂. Antennae yellowish on basal half or more. Thorax with the pronotum darkened, but otherwise either entirely yellow or with only an indistinct median dark stripe on praescutum and some darkening of scutal lobes, pleurae entirely yellow. Abdomen mainly yellowish above as well as below; first two tergites broadly blackish at sides, next three or four with apical lateral corners more or less blackened. legs clearer yellow than in ♂, black knees conspicuous. Wings with pale yellowish tinge on most of membrane (therefore appearing much paler than in ♂), but veins dark except towards base and stigma rather dark grey and quite conspicuous; trichiation as in ♂. Halteres yellowish. Wing-length 7·8·5 mm.

♂ Hypopygium : Penis nearly straight, very slightly curved upwards at tip, with a somewhat peg-like membranous projection beneath towards base; parameres rather sharply bent beyond middle.

I first become acquainted with this species from two females found in Matley Bog, New Forest, one collected by Mr. H. Audcent on 16.vi.1929 and one by Mr. C. Morley on 6.vii.1934; the former was recorded by Audcent on my determination as *nobilis* Lw. In June 1937 I obtained a series of both sexes, first along a shaded stream in a wood at Rousdon, East Devon, and again in Matley Bog; this fresh material shows that the species cannot be *nobilis*. Type, a male from the former locality in the British Museum.

In addition to the above there is a female in the British Museum collected by Eaton and labelled 'Dendles Wood, 16.vi.15.'

GNOPHOMYIA O.-S.

(Pl. V, fig. 1.)

Easily distinguished by venation : R_{4+5} continuing the direction of R_s ; R_{2+3} arched; $r-m$ exactly at origin of R_{2+3} ; all apical cells of wing long; r present, very far from tip of R_1 and opposite tip of Sc ; $m-cu$ near base (or at least near middle) of the long discal cell. Eyes rounded, well separated on under surface of head as well as above. Praescutum with rather large humeral pits but no trace of anterior pits. Middle and hind coxae slightly separated, but meron not greatly developed. Front and middle legs subequal in length, hind legs somewhat longer. Claws simple.

There is probably only one European species; two names which have been catalogued as distinct species are synonyms, and Meigen's *sylvatica*, referred by Osten-Sacken to *Gnophomyia*, does not belong to this genus but is a *Ula*; Walker's *L. vagans* is also a *Ula*.

Gn. lugubris Zett. (Pl. V, fig. 1.)

Syn. *viridipennis* Gimm.; *tripudians* Bergr.

Black, including antennae, palpi and legs (except bases of femora); head dusted with grey, also pleurae to a slight extent; mesonotum and abdomen somewhat shining, with faint bluish tinge. Wings clear, with strong black veins. Halteres with bright yellow knob, stem blackish except at base. Wing-length 6.9 mm.

Hypopygium : Tergite with two triangular bare points, outer style long, slender, bare.

Rotten tree-trunks, gregarious. Bucks, Cambs., Cheshire, Glos., Northampton, Suffolk, Yorks. v-vii.

De Meijere's figure, purporting to represent the hypopygium of *G. lugubris* in fact depicts *Limnophila filata*; Kuntze's figure of a wing is certainly no *Gnophomyia* but probably some *Limnophila* sens. lat. (*meridiana* Staeg.?).

GONOMYIA Mg. (sens. lat.).

(Pl. V, figs. 13-16; text-figs. 19, 20.)

This genus as a whole is characterised by the slight development of hairiness; tendency to reduction of vein R_2 ; absence of any trace of cross-vein r ; forward position of anterior pits of praescutum; small meron closely contiguous with the middle coxa, with consequent close approximation of middle and hind coxae; simple claws. Some of these features seem to ally the group with the Hexatomini rather than with typical Eriopterini. There is so much variation in wing-venation between the different subgenera and species that it is difficult to define the genus satisfactorily; nevertheless the four subgenera do seem to be rather closely allied. Evidence of this relationship may be seen, for example, in the possession by many of the species of three separate styles on the male coxite, a very unusual feature; also in the fact that in all species of *Gonomyia* the origin of the posterior cubitus is very markedly distal to the basal cross-vein connecting the two anal veins (axillary cross-vein). In this last feature *Gonomyia* differs from all other Eriopterini and resembles the *Pediciini* (see text-fig. 19).

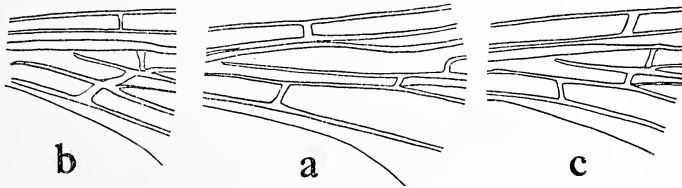


FIG. 19.

Base of wing, showing relative positions of the basal cross-veins and vein-connections in *Gonomyia* (a) and, for comparison, *Erioptera* (b) and *Triclyphona* (c). Note retracted axillary cross-vein in a and c.

Tibial spurs are commonly said to be absent in *Gonomyia*, this being one of the reasons why the genus is placed among the Eriopterini. However a close examination will nearly always show that two of the hairs at the tip of the middle and hind tibiae are slightly longer and thicker and decidedly blacker than the others, and it seems evident that these hairs represent the spurs; they occur in all four subgenera, and among British species I have failed to find them only in *G. alboscuteolata*.

The first two subgenera (*Ellipteroides* and *Idiocera*) have several features in common (such as the presence of the arcular cross-vein) which are not found in the other two. On the other hand, the differences between *Gonomyia* and *Lipophleps* are largely bridged by exotic species. It might therefore be justifiable to divide *Gonomyia* as hitherto understood into two genera: *Idiocera*, with subgenera *Idiocera* (s.str.) and *Ellipteroides*; and *Gonomyia*, with subgenera *Gonomyia* (s.str.) and *Lipophleps*.

Subgenus **ELLIPTEROIDES** Becker.

Syn. (?) *Progonomyia* Alex. (Pl. V, fig. 15.)

Sc extending nearly to level of outer end of *Rs*. R_2 present, less oblique than in the other subgenera, as long as R_{2+3} and more or less continuing the direction of that vein. R_3 not curved at tip. Cell R_{4+5} not narrowed apically. Discal cell present or absent (if absent confluent with third posterior). Cross-vein *m-cu* at or near fork of *M* (i.e. both basal cells about equal in length). Arcular cross-vein present.

Hypopygium peculiar in having three separate styles, and hairs on the tip of the simple, symmetrical aedeagus.

I have recently referred to this group under the name *Progonomyia* Alex.; but on the one hand it is somewhat doubtful if the genotype of *Progonomyia*, a South American species, is closely related to the old-world forms, and on the other hand it has been shown that the genotype of *Ellipteroides* (*piceus* Becker, from North Africa) is a close ally of *lateralis* Mcq.

G. (E.) lateralis Mcq. (Pl. V, fig. 15.)

Syn. *flavolimbata* Hal., Dale, *manifesta* Walk.

Head dull dark grey, antennae and palpi black. Thorax shining black; posterior pronotal angles yellow; a narrow bright yellow stripe on notopleural suture and a broader one on lower part of pleurae. Abdomen and legs entirely black, somewhat shining. Wings with brown tinge; veins dark; R_{2+3} and R_2 subequal in length; discal cell absent. Wing-length 7 mm. Halteres blackish.

Hypopygium normally reflexed over abdomen; coxite ending in a long thick process, longer than the basal portion; three completely separate styles, all rather small; aedeagus a stout, conical structure, hairy at tip.

Cambs, Devon, Dorset, Herts, Suffolk. vi.

G. (E.) alboscuteolata v. Ros.

Syn. *scutellata* Egg.

Differs from *lateralis* in having thorax dull blackish-brown with scutellum pale yellowish; yellow markings of pleurae

duller; coxae, trochanters and bases of femora yellowish-brown; wings with more obvious macrotrichia on veins and with vein R_2 more than half as long again as R_{2+3} . Discal cell present. Wing-length 7·8-8·5 mm.

Hypopygium: Coxite rounded, without apical processes; three separate styles as in *lateralis*, but all large; aedeagus a curved tube, hairy at tip.

Hereford (Woolhope). vii.

Subgenus **IDIOCERA** Dale.*

Syn. *Ptilostena* Berger.; ? *Spyloptera* Rond.

Sc ending beyond base of *Rs*. R_2 always present, approximating to the vertical. R_3 more or less distinctly curved up at tip. Cell R_{4+5} not narrowed apically. Discal cell always open and confluent with third posterior cell. Cell M_1 long-stalked. Cross-vein *m-cu* at least its own length before fork of *M* (in other words, lower basal cell markedly shorter than upper). Arcular cross-vein present.

Hypopygium somewhat intermediate in type between *Ellipteroides* and *Gonomyia*; three separate styles present, but aedeagus without obvious pubescence at tip, symmetrical and without appendages.

G. (I.) sexguttata Dale. (Pl. V, fig. 13.)

Syn. *albicornis* Hal. MS., *pulchripennis* Lw., *sexmaculata* Hal.

Readily distinguished by the extensive wing-markings, including numerous small spots in costal cell and a large spot over tip of vein $2A$; whitish areas adjoin the dark marks, the remainder of the wing being somewhat clouded. Thorax grey; mesonotum with a pair of conspicuous dark brown stripes running the whole length; pleurae with a yellow stripe below middle. Wing-length 6·5-7·5 mm.

Hypopygium: Coxite with an apical thumb-like process as in *Gonomyia* s.str., and with three completely separate styles, the lowermost flattened, with a short inner thumb and a long pointed black finger, the other two both simple, each ending in a long black point; aedeagus a simple bare tube.

Cornwall (St. Merryn), Dorset (Glanville's Wootton). vi.

G. (I.) punctata sp. n. (Lackschewitz MS.).

Wings with narrow dark seams on cross-veins and at base of cell M_1 ; a dark spot at arculus and with three dark spots near costa (at base of *Rs*, stigma, and on upturned tip of R_3); costal

* Dale's name has been overlooked. It was proposed (Ann. Mag. Nat. Hist., 8: 431 and 433, 1842) as a subgenus of *Limnobia* and with a '?' for *sexguttata*.

and anal cells quite clear. Venation peculiar in that the short vein R_2 is nearly vertical and ends either exactly in the tip of R_1 or in the costa immediately beyond. Mesonotum greyish, with a pair of dark brown stripes widening posteriorly, much as in *sexguttata*; pleurae largely yellowish, grey-dusted, with a dark brown stripe across middle, lower part of sternopleura also dark brown. Abdomen blackish above, brown beneath, posterior margins of segments narrowly pale yellow. Legs yellowish, tarsi and tips of femora and tibiae darkened. Wing-length 6-7.5 mm.

Hypopygium: Dorsal prolongation of coxite forming a broad triangular lobe rather than a finger-like process; three separate styles as in *sexguttata*, the lowermost formed much as in that species, but of the other two styles the outer is divided almost to the base into two somewhat unequal curved prongs, and the inner is short, broad, flattened, with a small point at tip; aedeagus a long tube bearing a few hairs above and a black point on each side at tip.

Hereford (Monnow Valley), Westmorland (Melkinthorpe), Worcester (Wyre), Yorks (Mulgrave Woods, type ♂). vi-viii.

This was recorded by Bradley as *G. jucunda* Lw., a determination which is possibly correct, but Loew's type possessed an extra cross-vein in cell R_3 (absent in British specimens), and his description indicates a smaller insect with some other small points of difference from our material. Pending re-examination of the type, I follow Lackschewitz in considering the British form distinct.

G. (1.) *connexa* Lw.

Differs from the other two species of the subgenus in having the wings clear except for the light brown stigma, and vein R_3 not recurved at tip. Mesonotum with indication of two brown stripes, not well marked. Pleurae mainly blackish, grey-dusted, with yellow stripes above and in middle. Scutellum yellow with dark median line. Abdomen with posterior borders of segments narrowly yellowish. Wing-length 7 mm.

Dumbarton (Murroch Glen), Glamorgan (Porthcawl). vi.

Subgenus **GONOMYIA** Mg., s. str.

(Pl. V, fig. 14; text-fig. 20.)

Sc ending opposite or a little beyond base of R_s . R_{2+3} more or less arched upwards. R_2 always distinct and oblique; R_3 curved down rather than up at the tip. Cell R_5 only slightly if at all narrowed at tip. Discal cell present, not conspicuously narrowed at base, the three veins proceeding from it not noticeably divergent, *m-cu* at or a little beyond its base. Arcular cross-vein absent.

Hypopygium: Coxite with a small finger-like hairy projection at tip; only two styles (in the British species; the Scandinavian *edwardsi* Lack. has three), the outer one hairy and directed straight backwards, never infolded. Aedeagus and its appendages (in all the British species) more or less asymmetrical, never hairy.

KEY TO BRITISH SPECIES OF GONOMYIA S. STR.

1. Third antennal segment yellow *bifida* Tonn.
Antennae all black 2.
2. Scutellum dull; pleurae with dark markings 3.
Scutellum shining; pleurae all yellow 5.
3. Proboscis darkened *simplex* Tonn.
Proboscis yellow 4.
4. Pleural markings usually brownish *tenella* Mg.
Pleural markings blackish *dentata* de Meij.; *conoviensis* Barnes.
5. Discal cell shorter; penis short *lucidula* de Meij.
Discal cell longer; penis very long and tubular *recta* Tonn.

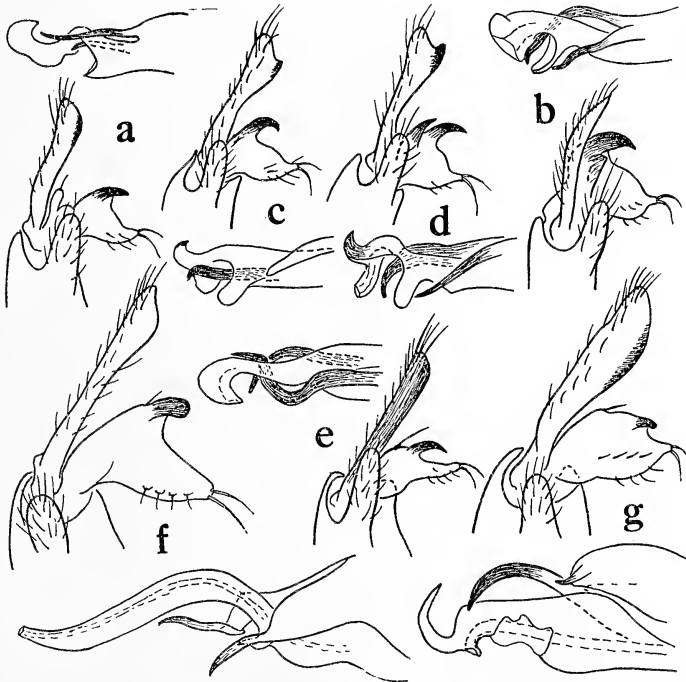


FIG. 20.

Gonomyia s.str. Styles, with tip of coxite, from above; and tip of aedeagus, from side (to same scale): a, *tenella*; b, *lucidula*; c, *dentata*; d, *conoviensis*; e, *bifida*; f, *recta*; g, *simplex*.

***G. (G.) bifida** Tonn. (Text-fig. 20, e.)

Head greyish above, with yellow rostrum and occiput; antennae blackish except for the third segment, which is mainly or entirely yellowish; palpi black. Thorax mainly dull greyish-brown above, scutellum lighter and slightly shining; pleurae yellowish without dark markings. Abdomen dark above. Wings with venation practically as in the other species of the subgenus; *m-cu* often (but not always) a little before base of discal cell (in the other species it is usually slightly beyond base of discal cell, but rather variable in position). Wing-length 6 mm.

Hypopygium: Outer style rather narrow, dark throughout, without projection on inner side; inner style with one rather slender black tooth and no projection at base; aedeagus with two equally stout black hooks, one slightly longer than the other and twisted round so that both lie on the same side of the penis, which has a flattened, cowl-like tip.

Devon (Slapton), a single ♂ taken by Verrall, 24.viii.1885.

G. (G.) tenella Mg. (Text-fig. 20, a.)

Head dark greyish except for the orange-yellow proboscis; antennae and palpi wholly blackish. Thorax dull dark grey above; pronotum pale yellow, also sides of praescutum; scutellum yellow, dull like remainder of mesonotum; pleurae mainly yellow, with a brown to blackish patch in middle (sometimes faint) and another on lower part of sternopleura. Abdomen blackish-grey above except for the yellow lateral margins of tergites; venter wholly yellow. Legs light to dark brownish. Wings clear with faint stigma; discal cell usually rather less than twice as long as broad. Wing-length 5.6-5 mm.

Hypopygium: Outer style with a small blackened area on inner side, which is smoothly rounded, not tooth-like; inner style with one stout black tooth and a small thumb-like projection at base; aedeagus with two long pointed black hooks, one stouter than the other; penis ending in a broad, blunt, flattened pale hook.

Common. Beds., Cambs., Devon, Dorset, Herts, Hunts, Merioneth, Salop. v-viii.

G. (G.) dentata de Meij. (Text-fig. 20, c.)

Syn. *incisurata* Tonn.

Very similar to *tenella*, but somewhat larger and pleural markings always blackish. Wing-length 5.5-7 mm.

Hypopygium: Outer style with the blackened area on inner side near tip tooth-like; inner style with one strong and long curved black tooth and no thumb-like process at base; aedeagus with only one stout black hook; penis stout, of irregular shape, truncate at tip.

Common, chiefly in the west and north. Records from Carnarvon, Devon, Hants, Inverness, Kerry, Merioneth, Salop, St. Kilda, Sutherland, Westmorland, Yorks. v-viii.

G. (G.) conoviensis Barnes. (Text-fig. 20, d.)

Syn. *bispinosa* Barnes nec Alex.

Closely resembles *dentata*; no external differences obvious.

Hypopygium: Outer style much as in *dentata*, black tooth rather variable, sometimes just before and sometimes right at the tip; inner style with two teeth, usually both black, but the smaller inner tooth sometimes pale; aedeagus much as in *tenella*, with two pointed black hooks, but tip of penis differently shaped; sternite more produced and pointed than in allied species.

Carnarvonshire (Conway Valley and Methlem), Hants (Milton), Merioneth (Llwyngwrit), Yorks (Mulgrave Woods). vi, viii.

G. (G.) simplex Tonn. (Text-fig. 20, g.)

Very similar to *dentata*, but proboscis more or less darkened above and abdominal sternites greyish-tinged, not clear yellow.

Hypopygium: Outer style with rounded blackened area on inner side, as in *tenella*; inner style with one or two small black teeth and no basal projection; aedeagus with one strong black hook apart from the tip of the penis, which itself forms a slender pointed hook (a distinctive feature of this species).

Arran, Carnarvon, Flintshire, Inverness, Merioneth, Perth, Salop, Stirling, Sutherland. v-vi.

G. (G.) lucidula de Meij. (Text-fig. 20, b.)

Differs from *tenella* and related species in having the scutellum and most of scutum slightly but distinctly shining, and the pleurae wholly orange-yellow, with practically no trace of darker markings. Venter wholly orange-yellow, lateral margins of tergites rather more broadly yellow than in *tenella*. Antennae black; proboscis yellow. Wing-length 5.5-7 mm.

Hypopygium: Outer style small, without blackening on inner side; inner style forming a broad, pointed, curved blade; aedeagus with one black hook fitting into a notch in the irregular-shaped penis, and a smaller paler hook.

Records from Argyll, Beds, Carnarvon, Devon, Flintshire, Inverness, Lancs, Morayshire, Salop, Suffolk, Ross, Westmorland. vi-vii.

G. (G.) recta Tonn. (Text-fig. 20, f.)

Resembles *lucidula* rather closely, but even more yellow; head with a yellow area above antennae and extensively yellow at back. Discal cell longer than in the average *lucidula*. Wing-length 6.5-8 mm.

Hypopygium: Easily distinguished, even with a hand-lens, from other species of the subgenus by the very long, tubular penis. Outer style long, inner margin not blackened; inner style with blunt black process in middle of outer margin; aedeagus with two small, unequal pale hooks.

Near streams, especially among butter-bur. Devon, Isle of Wight, Herts, Salop, Suffolk, Yorks. vi-vii.

Subgenus **LIPOPHLEPS** Bergr.

Syn. *Leiponeura* Skuse, nec *Liponeura* Lw.

(Pl. V, fig. 16.)

Sc_2 ending before base of R_s (opposite this point in many exotic species). R_{2+3} not arched upwards. R_2 very short and vertical (absent in many exotic species). Cell R_{4+5} narrowed at tip. Discal cell present, narrowed at base, the three veins proceeding from it divergent, *m-cu* at its base. Arcular cross-vein absent.

Hypopygium with all parts symmetrical; two styles; outer style infolded, bare.

G. (L.) abbreviata Lw. (Pl. V, fig. 16.)

Easily distinguished by the peculiar venation, especially the very short, angulate R_s and the very short, vertical R_2 . Head blackish. Thorax dark brown above, pronotum and notopleural suture whitish, pleurae with a broad whitish-grey stripe below middle. Wings nearly clear, length about 5 mm.

Hypopygium: Coxite without apical thumb-like process; inner style almost completely divided into a black, toothed portion and a pale, hairy portion; aedeagus large, symmetrical, toothed.

Local. Beds., Cambs., Dorset, Middlesex, Oxon, Salop, Yorks. vi.

RHABDOMASTIX Skuse.

Syn. *Sacandaga* Alex.

(Pl. V, fig. 10; text-figs. 21, 22.)

This genus seems to some extent to connect the *Gonomyia* and *Erioptera* groups, agreeing with the former in its nearly bare body and wings, forward position of anterior pits of praescutum, absence of cross-vein *r*, and presence of hair-like spurs on the tibiae, but approaching the latter in the enlarged meron.

Apart from the distinctions given in the key, *Rhabdomastix* differs markedly from *Gonomyia* (and also from any genus of the *Erioptera* group) in hypopygial structure, particularly in having the chitinous ring of the ninth segment more or less

widely interrupted above by an area of membrane; the outer style is of rather characteristic form, with its outer margin and tip minutely spinulose.

The typical Australian species have very long antennae in the males; most of those in the northern hemisphere have the antennae quite short in both sexes (subgenus *Sacandaga*), but intermediate forms occur.

The British species are found by rapid streams, in the case of *R. parva* usually crawling on stones or rocks.

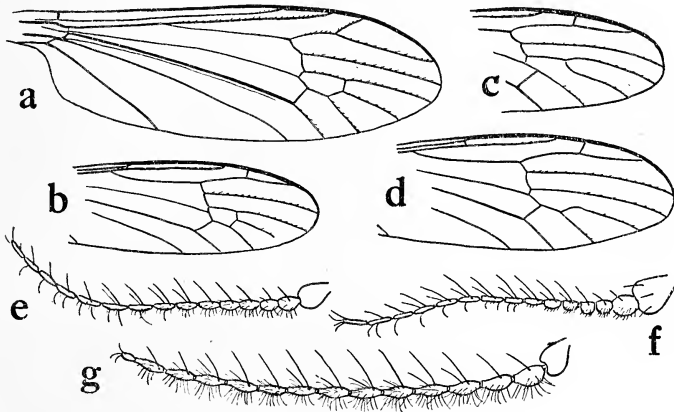


FIG. 21.

Wings and ♂ antennae of *Rhabdomastix* (b-d to larger scale than a; e-g to same scale; first scapal segment omitted in e-g; note relatively larger second segment in f). a, g, *inclinata*; b-d, *parva* (showing variation); e, *laeta*; f, *hilaris*.

KEY TO EUROPEAN SPECIES OF RHABDOMASTIX.

1. R_2 longer and markedly oblique, Sc_2 absent 2.
- R_2 very short and vertical, Sc_2 present 3.
2. Postnotum and pleurae dark *inclinata* sp.n.
- Postnotum and pleurae yellow *lurida* Lw.
3. Dark species with posterior margins of tergites yellow . *schistacea* Schum.
- Abdomen unicolorous 4.
4. Small dark species with grey thorax; Sc_2 at tip of Sc 5.
- Larger, wings broader; Sc_2 well before tip of Sc 6.
5. Vein 2a longer; outer ♂ style flattened, much as in *Elaeophila*
 *beckeri* Lack.
- Vein 2a short; outer ♂ style not flattened *parva* Siebke.
6. Antennae longer and more pubescent, body all yellow *laeta* Lw.
- Antennae shorter and less pubescent 7.
7. Dark species with blackish head, tips of femora broadly darkened
 *lapponica* Tjeder.
- Lighter, tips of femora not obviously darkened 8.
8. Head yellow, thorax mainly so *hilaris* sp.n.
- Head grey, thorax darker *hilaris* var. ?

Rh. hilaris sp. n. (Text.-fig. 21, f; 22, a, b; Pl. V, fig. 10.)

Head rather bright yellow with a more or less distinct brown median stripe. Antennae with first segment bright yellow, remainder black; first four or five flagellar segments rather short, rounded, with short pubescence beneath which is only about half as long as diameter of segments; remainder more slender, almost cylindrical, without distinct pubescence, terminal segment not shorter than penultimate. Thorax mainly yellow; praescutum with indications of three darker stripes which are more or less obscured by yellowish dust, median stripe distinct and blackish towards front; pronotum dark in middle above, otherwise yellow. Abdomen light yellowish-brown. Legs slender, light brownish, femora scarcely darkened at tips. Wings fairly broad, clear, veins mostly pale, without macrotrichia except on R_1 , R_{4+5} and branches of M . Venation: Sc_2 present, well before tip of Sc , which reaches nearly to end of Rs ; R_2 short and vertical; M_1 rather strongly arched at base; $2A$ sinuous, reaching well beyond level of base of Rs . Wing-length 7-9 mm.

Hypopygium: Outer style pale, rather short; parameres pale, clubbed, not distinctly spinulose on distal margin; ninth segment with a membranous area above which completely divides the tergite.

Inverness (Aviemore, Nethy Bridge), Perth (Rannoch). vii.

In one male from Aviemore which is otherwise very similar to the above the head is entirely grey (possibly discoloured); antennae perhaps slightly longer, with the first segment darkened; and parameres with their outer distal margin spinulose (text-fig. 22, a). This may represent a distinct species or may be merely a variation of the above.

Another male from Aviemore has the head mainly grey, and parameres with spinulose margin as in the above specimen, but has the veing R_2 longer and oblique.

I have previously recorded this species as *R. laeta* Lw., but apparently incorrectly. The true *laeta*, as represented in the British Museum by two males from Latvia, is smaller and has distinctly longer antennae (relatively to its size), with the flagellar segments more oval and with longer pubescence (text-fig. 21, e); head entirely yellow, as well as the first antennal segment; praescutum not blackened in middle in front; abdomen more yellowish, scarcely darker than thorax; hypopygium with the coxites rather more slender, parameres less clubbed (text-fig. 22, c).

Another very similar Continental species is *lapponica* Tjeder (*infuscata* Lack.); this closely resembles *hilaris* as regards structure of antennae and venation, but is a much darker insect, with blackish head, largely dark thorax, dark abdomen, and broadly darkened tips to femora and tibiae; it also differs rather

obviously in the form of the male parameres, which have a sharp angle or tooth on the outer side near the tip (this is very well marked in a male in the British Museum from Abisko, fig. 22, d).

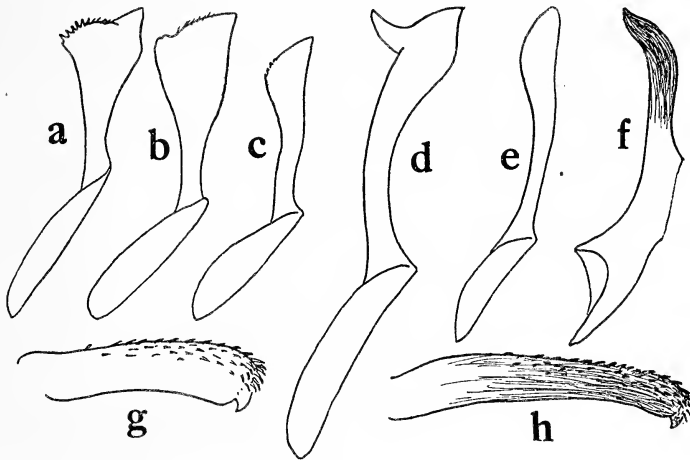


FIG. 22.

Parameres and outer styles of ♂ hypopygium of *Rhabdomastix*, to same scale: a, *hilaris*, var.; b, g, *hilaris*, type; c, *laeta*; d, *lapponica*; e, *parva*; f, h, *inclinata*.

Rh. parva Siebke (teste Lackschewitz 1933).

(Text-fig. 21, b-d; 22, e.)

Syn. *schistacea* Lw., Verr., nec Schum.

Entirely blackish except for trochanters and halteres; head and thorax heavily dusted with grey. Segments of antennal flagellum all rather shortly oval, without obvious pubescence. Wings rather narrow, greyish, veins dark; macrotrichia absent from R_2 and R_3 , or very few. Venation: Sc_2 close to tip of Sc , which ends near or even before middle of Rs ; R_2 very short and vertical; M_1 somewhat arched at base; $2A$ short, straight, ending just before level of base of Rs ; discal cell normally present as in the other species, but not infrequently absent, in which case M_3 may arise either from M_1 or from M_4 , or may lie free without attachment. Wing-length 4.5 mm.

Hypopygium formed almost as in *hilaris*, but clubbed portion of parameres rather longer in relation to the basal part.

Derby, Devon, Glasgow, Hereford, Perth, Westmorland, Yorks. v-vi.

This is the species which has been recorded in Britain as *schistacea* Schum., but I do not believe it can be that species. Schummel's description and figure certainly indicate a dark species of *Rhabdomastix*, but he states that in his type female from Breslau the thorax is yellowish-grey and the posterior margins of the abdominal tergites yellow; his figure indicates a sinuous vein 2A extending well beyond level of base of *Rs*. I therefore feel bound to conclude that the true *schistacea* is distinct from any of the five or six British and European species known to me. Loew in 1873 evidently thought the same, though he followed a previous determination and described our species as *schistacea*.

* **Rh. inclinata** sp. n. (Text-fig. 21, a and g; 22, f.)

Head dark brownish, grey-dusted; antennae and palpi black, first antennal segment obscurely brownish; all flagellar segments except the last one, which is unusually small, with long dense pubescence which is markedly longer than diameter of segments, most of them spindle-shaped, narrowed at each end. Thorax dark brownish-grey, sides of praescutum and the scutellum lighter but colour obscured by grey dusting; posterior pronotal lobes yellow; pronotum and pleurae almost wholly dark brownish-grey. Abdomen blackish. Legs dark brown. Wings clear, rather broad, nearly all veins at tip bearing numerous distinct macrotrichia, including R_2 and R_3 . Venation: Sc_2 absent (in only one of the seven specimens examined is it faintly indicated, a short distance before tip of *Sc*); *Sc* reaching almost to end of *Rs*; R_2 strongly oblique, as in typical *Gonomyia*; M_1 almost straight; 2A nearly straight and reaching only a short distance beyond level of base of *Rs*. Halteres yellow. Wing-length 5.5-7.5 mm.

Hypopygium: Outer style black, longer and more slender than in the other species; parameres curved, pointed, blackened on distal half; tergite not completely divided, though the ring of the ninth segment is largely membranous above.

Yorks (Mulgrave Woods, near Whitby; 6 ♂♂, including type, 1 ♀). viii.

The absence of vein Sc_2 is a very unusual feature, indeed almost unique among British craneflies, but in spite of this and several other noteworthy differences from either of the other species there can be no doubt of the generic position.

It is possible that *R. inclinata* may be merely a dark variety of *lurida* Lw., which according to the description must have very similar venation and antennae. Loew mentions variability in the colour of the mesonotum but seems to imply that even in his darker specimens the scutellum, postnotum and pleurae remain wholly yellowish; on the other hand, in all the specimens

of *inclinata* the scutellum alone is yellowish (and not at all sulphur-yellow), the postnotum and pleurae being as dark as the praescutum. Loew's statement that the antennae of *lurida* are not quite so long as those of *laeta* also does not accord with our material.

Since describing this species I have examined a male and female of *lurida* from Loew's type series in Berlin, kindly lent by Dr. Delkeskamp. These specimens confirm the conclusion that *inclinata* is very closely related to *lurida* but distinct; they have the venation and trichiation of the wings and the length and structure of the antennae quite as in *inclinata*, but the colouring is as described by Loew and the parameres (though pointed and blackened) are shorter and more slender.

De Meijere's figure of the hypopygium of *laeta* shows pointed, blackened parameres and probably represents either *lurida* or *inclinata*.

CHEILOTRICHIA Rossi.

(Pl. V, figs. 11 and 12; text-fig. 23, b-d.)

Alexander would include *Cheilotrichia*, together with *Empeda* and perhaps *Gonempeda*, in the genus *Erioptera* sens. lat., but I prefer to separate them as indicated in the key. In addition to the venational character which affords the most obvious distinction, *Empeda* (all species) and *Gonempeda* differ from *Erioptera* (all subgenera) in having no pteropleural hairs. *Cheilotrichia* possesses a few of these hairs, but its close relationship to *Empeda* is so obvious that it seems most natural to include both in one genus.

In both *C. (G.) flava* and *C. (E.) cinerascens* there is a similar and rather strong sexual dimorphism in the antennae, the males having the second segment enlarged and the flagellum more slender (but not longer) than in the female, with extremely long dorsal verticils. This dimorphism is not noticeable, however, in *C. (C.) imbuta*, nor in the British species of *Erioptera*.

Subgenus GONEMPEDA Alex.

Syn. ? *Ilisophila* Rond. (Pl. V, fig. 11; text-fig. 23, d.)

Resembles *Empeda* in having the pleurae quite bare, but differs in venation. Radial fork very short, R_2 straight and oblique, much as in *Gonomyia*, not curved and almost horizontal as in *Cheilotrichia* and *Empeda*. Sc_2 not far from tip of Sc . Discal cell closed, veins arising from it straight and divergent, M_4 not recurved at tip (this feature distinguishing *Gonempeda* rather sharply from *Erioptera* s.str., *Cheilotrichia*, *Empeda* and *Ilisia*). Differs further from *Empeda* in having the hypopygium normal, not inverted; the coxite with a ventral apical projection but no dorsal projection between the styles.

C. (C.) flava Schum. (Pl. V, fig. 11; text-fig. 23, d.)

Pale yellow, including head, thorax, abdomen, legs, halteres and wing-veins; eyes and hypopygial appendages black; palpi, and antennae from second segment onwards, blackish. Wing-length about 5 mm.

Common: Records from Derbyshire, Glamorgan, Herts, Isle of Wight, Merioneth, Morayshire, Renfrew, Salop, Sussex, Yorks. vi-vii.

Subgenus **CHEILOTRICHIA** s. str.

(Text-fig. 23, c.)

Characters as in *Erioptera*, with the following exceptions: Radial fork shorter, the cross-vein *r* placed well before the fork. *Sc*₂ close to tip of *Sc*. Discal cell present. Vein 2*A* shorter and straight. Pteropleural hairs reduced in number (though several are present). Hypopygium inverted, the tergite ventral; coxite with a small apical hairy projection which lies between the bases of the two styles instead of dorsal to both as in *Erioptera*.

The venation agrees with *Erioptera* s.str. in that the branches of the radial and median forks run parallel. The veins are conspicuously hairy.

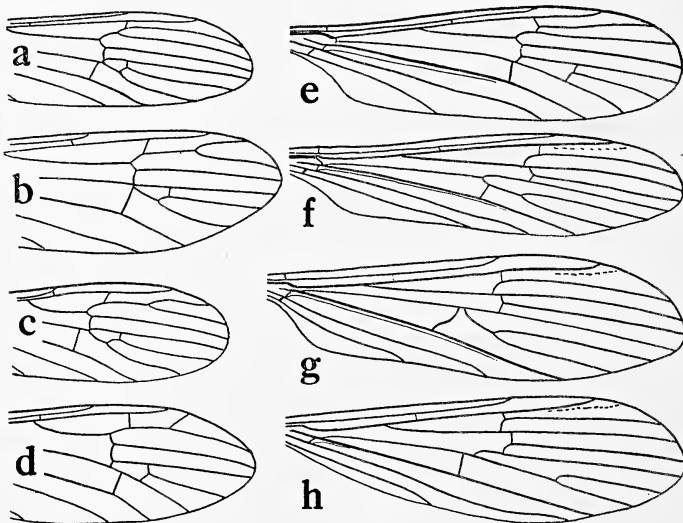


FIG. 23.

Venation of Eriopterini: a, *Ilisia areolata*; b, *Empeda cinerascens* (abnormal specimen with closed discal cell); c, *Cheilotrichia imbuta*; d, *Gonempeda flava*; e, *Psilocoenopa pusilla*; f, *Molophilus obscurus*; g, *M. pusillus*; h, *Tasiocera murina* (a-d to slightly smaller scale than e-h).

C. (C.) imbuta Mg. (Text-fig. 23, c.)

Pale yellow; eyes, palpi, scape (not flagellum) of antennae and hypopygial appendages black. Legs pale yellow, tips of front and middle femora, bases of front and middle tibiae, and extreme tips of all tibiae and tarsal segments black. Wing-length, 4-4.5 mm.

Common: Cambs, Cheshire, Derbyshire, Herts, Inverness, Oxon., Staffs, Yorks.

Subgenus **EMPEDA** O.-S.

(Pl. V, fig. 12; text-fig. 23, b.)

This genus or subgenus as formerly understood has now been split into two by Alexander, the European *E. flava* Schum. being placed in a new genus *Gonempeda*. *Empeda* in the restricted sense agrees with *Gonempeda* and differs from all the other groups of Eriopteraria in having the pleura completely bare, with no hairs whatever on the pteropleura. In almost all other characters, notably in the distal position of Sc_2 , in the inverted hypopygium and the position of the apical projection of the coxite between the styles, *Empeda* agrees with *Cheilotrichia*; the fork of R_{2+3} is indeed shorter than in *Cheilotrichia*, Sc_2 is not so near the tip of Sc , the discal cell is absent,* and the hair on the wing-veins less conspicuous, but these features are of no great importance, and the only possibly valid reason for the retention of *Empeda* as a genus or subgenus distinct from *Cheilotrichia* is the absence of pteropleural hairs in the former and their presence in the latter.

C. (E.) cinerascens Mg. (Pl. V, fig. 12; text-figs. 23, b; 25, e.)

Syn. *nubila* Schum., *diluta* Zett.

Head dark grey; antennae and palpi blackish. Thorax rather dark grey above, pleurae usually light brownish but grey-dusted; posterior pronotal angles whitish-yellow. Abdomen dark brownish. Wings clear, veins greyish. Halteres yellow. Wing-length 5-7 mm.

Hypopygium: Outer style long, slender, pointed, with a short tridentate branch arising near base.

Common: England, Scotland, Wales. v-x.

Meigen's mention of the enlarged second antennal segment supports the evidence of the specimen still existing in his collection that his name *cinerascens* was proposed for our common *Empeda* and is not a synonym of *Erioptera trivialis* as has sometimes been supposed.

Two closely allied species (*E. affinis* Lack. and *E. neglecta* Lack.) have been found in Eastern Europe and may occur in Britain; they differ from *nubila* chiefly or solely in the form of the male styles (text-fig. 22, f, g).

* Except in abnormal specimens, such as the one figured in text-fig. 20, b.

ERIOPTERA Mg.Syn. ? *Polymeda* Mg.*

Erioptera typifies a group of closely allied genera and subgenera which in addition to the main tribal characters of Eriopterini (absence of tibial spurs and presence of four branches to the radius) have the following features in common: Anterior pits of praescutum placed well back, almost in transverse line with the large humeral pits. Middle and hind coxae rather widely separated, the meron very large, separate from the middle coxa (text-fig. 17, e). Middle legs very noticeably shorter than either of the other pairs, this shortening affecting all parts of the legs. Neck-plates of characteristic L shape. Claws simple. Basal cross-veins connecting the two anal veins very oblique and thick, almost in a line with the base of the posterior cubitus (text-fig. 19, b).

These characters are shared by the following groups: *Erioptera*, *Psiloconopa*, *Symplecta*, *Trimicra*, *Cheilotrichia*, *Empeda*, *Gonempeda*, *Ilisia*, *Ormosia*, *Molophilus*, *Dasymolophilus*. These constitute the subtribe Eriopteraria in Britain.

As in the case of the genus *Limnophila*, so also with *Erioptera*, difficulties arise and divergent views have been expressed in defining the limits of nearly allied genera and in deciding which groups shall be admitted to full generic rank. For the sake of uniformity of treatment in the present work I propose to employ the generic name *Erioptera* in a wider sense than usual, defining it as indicated in the key and including *Symplecta*, *Trimicra* and *Psiloconopa* as well as *Ilisia*, but separating *Cheilotrichia* (together with *Empeda* and *Gonempeda*).

Subgenus **ERIOPTERA** Mg. (s. str.).

(Pl. V, fig. 8; text-fig. 24.)

Erioptera in the restricted sense differs from other members of the Eriopteraria by the following combination of characters: Wing-veins more or less conspicuously hairy. Fork of R_{2+3} long, cross-vein r on R_2 a little beyond the fork, R_2 horizontal. Sc_2 very far from tip of Sc or absent. Discal cell usually absent (*E. trivialis* is the only exception among the British species). Vein M_4 distinctly recurved so as to run parallel with M_3 . Vein $2A$ very long and sinuous, so that the distance between tips of $1A$ and $2A$ is little if any greater than between Cu and $1A$. Pteropleura with a conspicuous tuft of long hairs; some hairs also present on sternopleura. Hypopygium not inverted, the tergite occupying the normal dorsal position.

* Those who accept the validity of this name as dating from 1800 may prefer to use it in place of *Erioptera*; but as *Erioptera* is a well-known tribal name, while *Polymeda* has never been adopted by any leading student of the group, I consider the change undesirable.

KEY TO BRITISH ERIOPTERA S.STR.

1. Wing-veins conspicuously hairy; praescutum unstriped 2.
 Wing-veins almost bare; praescutum with a narrow median black stripe 10.
2. Yellow species, abdomen and halteres yellow, also wings 3.
 Darker, at least abdomen or halteres (or both) darkened 5.
3. Body and wings rather pale yellow 4.
 Body and wings more brownish-yellow *squalida* Lw.
4. Palpi light to dark brown; eyes normal ... *flavescens* L.; *mejerei* Edw.;
nielseni de Meij.
 Palpi black; eyes large *divisa* Walk.
5. Wings darkened towards costa on distal half *limbata* Lw.
 Wings uniform 6.
6. Thorax yellowish, at least on pleurae 7.
 Thorax mainly or all dark 8.
7. Halteres with black knob *lutea* Mg.
 Halteres pale *griseipennis* Mg.; *nigripalpis* Goet.
8. A yellowish spot on shoulder *fusculentata* sp.n.
 Thorax all blackish 9.
9. Wings dark; praescutum with a slightly shining median stripe *fuscipennis* Mg.
 Wings paler; praescutum all dull *riedeli* Lack.
10. Discal cell closed (normally) *trivialis* Mg.
 Discal cell open *diuturna* Walk.

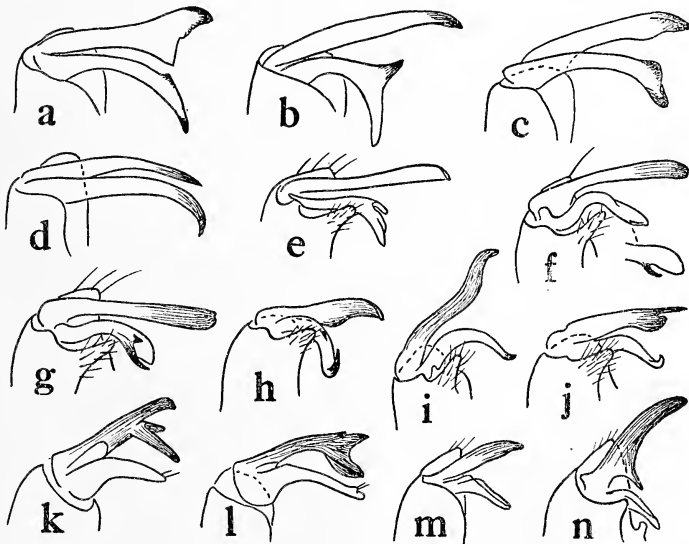


FIG. 24.

Erioptera. Styles, with tip of coxite (to same scale). a, *flavescens*; b, *mejerei*; c, *nielseni*; d, *squalida*; e, *divisa*; f, *fusculentata*; g, *fuscipennis*; h, *lutea*; i, *limbata*; j, *riedeli*; k, *griseipennis*; l, *nigripalpis*; m, *diuturna*; n, *trivialis*.

E. (E.) flavescens L. (Text-fig. 24, a.)

Wholly pale yellow, including head, base of antennae, thorax, abdomen, legs, halteres, wing-veins, and pubescence of whole body; only palpi and antennal flagellum more or less darkened and eyes black. Eyes alike in the two sexes, rather small, widely separated above and not or scarcely in contact beneath. Wing-length 6-8 mm.

Hypopygium: Coxite simple, without hairy finger-like projection at tip above; outer style broadly expanded apically, the expanded portion blackened to a variable extent; inner style with black tooth before tip, somewhat variable in size.

Common. England, Wales, Scotland, Ireland. vi-viii.

E. (E.) mejerei Edw. (Text-fig. 24, b.)

Closely resembles *flavescens*.

Hypopygium: Outer style strap-shaped, not expanded apically; inner style more curved, the black tooth nearer middle and much larger.

Cambs (Wicken) in company with *flavescens*. Suffolk (Orford). vi-vii.

E. (E.) nielseni de Meij. (Text-fig. 24, c.)

Very similar to *flavescens*, but general colour of body not such a bright yellow, and basal segments of antennal flagellum (especially in ♂) shorter and stouter, distal segments with longer hair.

Hypopygium: Outer style almost as narrow as in *mejerei*, inner style with a black hump near the rounded tip.

Dorset (Studland), Yorks (Austwick). vii-viii.

E. (E.) squalida Lw. (Text-fig. 24, d.)

Resembles *flavescens*, but general colour of body and legs more ochreous or brownish-yellow; second antennal segment as well as flagellum more or less darkened; palpi dark brownish. Eyes as in *flavescens*. Wing-length 7-9 mm.

Hypopygium: Both outer and inner styles long, simple, sharply pointed, with black tips.

Herts (Letchworth), Yorks (Gormire). vi.

E. (E.) divisa Walk. (Text-fig. 24, e.)

Syn. *macrophthalma* Lw.

A large pale yellow species superficially resembling *flavescens*, but from structure of eyes and hypopygium evidently more nearly related to *fuscipennis*. Differs from *flavescens* most obviously in having black palpi. Eyes large, especially in ♂, and broadly in contact beneath. Wing-length 6-9 mm.

Hypopygium: Coxite with apical hairy finger; outer style strap-shaped, inner lobed, both pale.

Probably common. Records from Ayr, Carnarvon, Hants, Herts, Kent, Salop, Somerset, Yorks. vi-vii.

Walker's type female is in good preservation and is obviously this species and not *flavescens* on account of the large eyes and black palpi.

E. (E.) limbata Lw. (Text-fig. 24, i.)

Distinguished from all other British species by having the wings broadly dark brown towards costa on distal half. Head dark above, but antennae mostly yellow; palpi black. Thorax and abdomen yellowish; legs pale yellow. Halteres dark. Wing-length 5 mm.

Hypopygium somewhat resembling that of *lutea*; outer style long, sinuous, black.

Dorset (Glanville's Wootton). vi.

E. (E.) griseipennis Mg. (Text-fig. 24, k.)

Syn. *fuscata* Verr. MS. (Carr, 1916).

Head yellowish-brown, grey-dusted. First segment of antenna yellowish, remainder more or less darkened. Palpi blackish. Eyes rather small, widely separated above. Thorax yellowish-brown, indistinctly darker above. Abdomen brown, tip pale. Legs rather pale brownish. Wing-hair greyish. Halteres yellowish or only slightly darkened. Wing-length 5.6-5 mm.

Hypopygium: Coxite without finger-like projection at tip; outer style divided into three divergent arms from near middle and more or less blackened; inner style pale, with a few small hairs at tip.

Probably common. Records from Cambs, Glasgow, Herts, Isle of Wight, Notts, Somerset, Sussex, Yorks. v-vii.

E. (E.) nigripalpis Goet., 1920. (Text-fig. 24, l.)

Syn. *verralli* Edw., 1921.

Similar to *griseipennis* but seems paler (the types, however, are somewhat immature).

Hypopygium similar in type to *griseipennis*, but outer style much less deeply divided, one of the three lobes represented by a small tooth.

Derbyshire (Dovedale). vi.

E. (E.) lutea Mg (Text-fig. 24, h.)

var. *taenionota* Mg.

Distinguished from all somewhat similar species found in Britain by the black knobs of the halteres (mentioned by Meigen in his original description). Head darkened above except round

eye-margins; antennal scape, or at least the first segment, yellowish, rest darkened; palpi blackish. Eyes smallish. Thorax either entirely yellowish (typical *lutea*) or with the mesonotum extensively dark brown in middle (var. *taenionota*). Abdomen yellowish (typical *lutea*) or dark brown with yellowish tip (var. *taenionota*). Legs light brownish, femora darker distally. Wing-hair greyish. Wing-length 5.7-5 mm.

Hypopygium: Coxite with small apical projection; inner style with tip black, pointed and recurved, a black tooth near middle. No differences discoverable in hypopygium between type and var. *taenionota*.

Common. England, Wales, Scotland, Ireland. v-x.

Typical *lutea* has not yet been found in Britain, all British material examined belonging to the var. *taenionota*.

E. (E.) fuscipennis Mg. (Text-fig. 24, g.)

Distinguished by the general blackish colour and dark, hairy wings. Head mainly dark, but with a whitish border to eyes. Antennae and palpi entirely blackish. Eyes in ♂ large, broadly contiguous on under surface of head. Thorax wholly blackish, even on shoulders, mesonotum slightly dusted, with a slightly more shining central stripe which is rather broad but indistinct; pleurae grey-dusted. Abdomen blackish. Legs mainly blackish; coxae dark. Halteres more or less darkened but rarely completely black. Wing-length 4-6 mm.

Hypopygium: Coxite with a hairy, finger-like projection at tip above; outer style strap-shaped, blackened on distal half or more; inner style divided beyond middle into a strong black pointed hook and a pale flat lobe, with an additional small black tooth.

Common. England, Wales, Scotland. v-ix.

Mr. C. H. W. Pugh distinguishes two forms of this species in Shropshire: a smaller form with the accessory tooth on lobe of inner style longer and a larger form with this tooth relatively smaller; the two forms are found in different types of locality.

* **E. (E.) fusculeta** sp. n. (Text-fig. 24, f.)

Allied to *fuscipennis*, which it resembles in its dark appearance, with antennae entirely dark and palpi black, differing in having a small yellowish area on each shoulder, pleurae partly yellowish, coxae yellowish, femora and tibiae rather extensively pale, and wings not quite so dark.

Hypopygium extremely similar to *fuscipennis*, but black hook of inner style smaller and the additional black tooth absent (eight specimens compared, from six different localities).

Herts (Hitchin, Radwell, Wallington, Harpenden), Middlesex (Harrow), Salop (Morda), Suffolk (Orford), Yorks (Nidd). vi-viii.

I recorded the pair from Harrow in 1921 as *E. minor* de Meij., but that determination was incorrect; de Meijere describes the palpi of *minor* as yellow and figures the inner style as simple, without a black hook; moreover, he has kindly compared a specimen of the British species with his type of *minor*, and informs me that the two species are distinct; *E. minor* is a yellow insect.

E. (E.) riedeli Lack. (Text-fig. 24, j.)

A dark species resembling *fuscipennis*, but thorax uniformly blackish-grey, mesonotum without any trace of a more shining central stripe; halteres yellowish; wings broader and paler than in *fuscipennis*. Eyes of ♂ rather large. Wing-hair moderately long and dense. Wing-length 6 mm.

Hypopygium: Coxite with apical hairy projection above; outer style with long sharp point arising subapically on outer margin (not shown in Lackschewitz's figure, but visible in paratypes), inner style pale, hooked at tip.

Inverness (Nethy Bridge). vi.

E. (E.) trivialis Mg. (Text-fig. 24, n.)

Distinguished from all other British species of *Erioptera* s.str. by having the discal cell closed (though even in *E. trivialis* occasional specimens have this cell open on one or both wings), and from all but *diuturna* in having the wing-veins very shortly hairy, appearing almost bare under a hand-lens. Body dark grey; antennae and palpi black; praescutum with a narrow black median line running its whole length; legs dark; wings nearly clear, with dark veins. Halteres yellow. Wing-length 6-7 mm.

Hypopygium: Coxite with a triangular projection ventrally and with a small hairy lobe dorsally at tip; outer style black, blade-like, with thumb-like projection on inner margin close to base.

Common. England, Wales, Scotland. iv-x.

E. (E.) diuturna (Walk.) Edw. (Text-fig. 24, m.)

Syn. *forsslundi* Tjeder, *zetterstedti* Lack.

Very similar to *trivialis*, but rather smaller, wings somewhat narrower and with thicker veins, and discal cell always open. In many specimens there are slight clouds over the cross-veins and sometimes a slight cloud in marginal cell below tip of R_1 . Wing-length 4-5 mm.

Hypopygium: Coxite lacking the hairy dorsal apical lobe; outer style black on distal third only and lacking the basal thumb; aedeagus quite different from *trivialis*.

Arran, Dorset, Glos., Isle of Wight, Merioneth, Montgomery, Salop, Sutherland, Yorks. viii-x.

Subgenus **SYMPLECTA** Mg.

Syn. *Helobia* St. Farg., nec Stephens; *Symplectomorpha* Mik.
(Pl. V, figs. 4 and 5; text-fig. 24A.)

Characters essentially as in *Erioptera* but wing-veins nearly bare (obvious short hairs present on distal parts of veins only); discal cell closed; vein M_4 straight; $2A$ very strongly sinuous distally (this last character affording the main distinction from *Psiloconopa* and *Trimicra*).

The name *Helobia* has recently been used for this genus; it antedates *Symplecta*, but is preoccupied by *Helobia* Stephens. The two British species have been placed in different genera or subgenera on account of the venational differences, but they are so obviously closely allied that this course seems unnecessary.

E. (S.) hybrida Mg. (Pl. V, fig. 5.)

Syn. *punctipennis* Mg.

Head grey, antennae and palpi black. Eyes larger in ♂ than in ♀, as in many *Erioptera*. Thorax dark ash-grey; praescutum with a black central line from front margin not quite to suture; another line on each side from humeral pit almost to scutellum; pleurae yellowish in middle. Legs brown, tips of femora and tibiae darker. Wings clear, with small dark spots or clouds on cross-veins, tips of Sc , R_1 and $2A$, and below base of Rs . An extra cross-vein in cell R_2 ; third posterior cell much longer than second; tip of $2A$ deeply waved. Veins on distal half of wing with very short macrotrichia, but R bare towards base, Rs entirely bare, Cu bare nearly as far as *m-cu*, and both $1A$ and $2A$ entirely bare. Wing-length 5-8.5 mm.

Hypopygium: Styles small.

Cambs, Cheshire, Hants, Hereford, Herts, Morayshire, Scilly Isles. iv, viii-ix.

This species is very widely distributed in the Palaearctic region; I have examined male specimens which agree well with British examples from Iceland, Algeria, Corsica, Palestine, Irak, N.W. India and Tibet. I find, however, that the American *E. (S.) cana* Walk., which has long been regarded as synonymous with *hybrida*, is in fact distinct, as is shown by the hypopygium of Walker's type from Hudson's Bay, which is entirely similar to that of a male in the British Museum from New Mexico. In *cana* (fig. 24A, h) the coxite has a much more prominent hairy apical projection beneath, and the outer style and the inner parameres are differently shaped from the corresponding structures in *hybrida* (fig. 24A, g). It remains to be shown whether these two forms are entirely confined to the Nearctic and Palaearctic regions respectively; possibly *cana* may also occur in the northern Palaearctic.

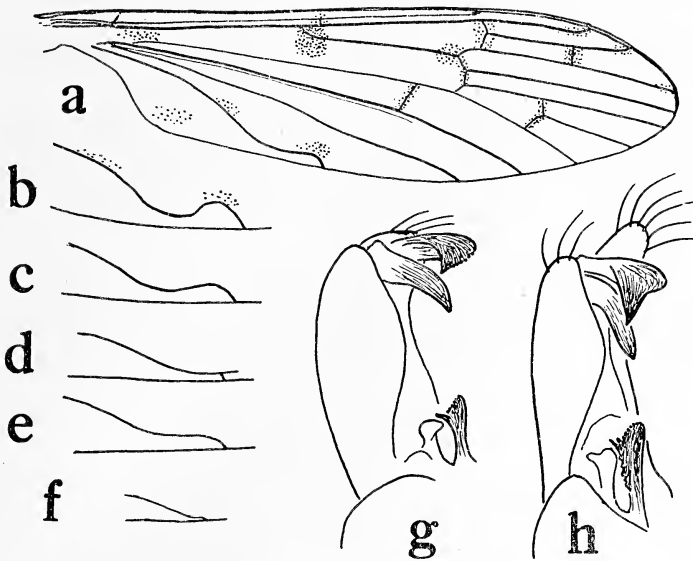


FIG. 24A.

Symplecta spp. a, Wing of *scotica*. b-f, Vein 2A, for comparison with *scotica*: b, *hybrida*, typical condition; c, *hybrida*, minimum degree of sinuosity (Palestine specimen); d-f, *stictica*, normal and brachypterous specimens (a-f to same scale). g-h, Hypopygium (half) from above: g, *hybrida*; h, *cana*.

* **E. (S.) *scotica*** sp. n. (Text-fig. 24A, a.)

Head uniformly light greyish, with antennae and palpi entirely dark, as in *hybrida*. Thorax as in *hybrida*; general colour light brownish-grey; scutellum entirely yellowish, also humeral angles; praescutum with three narrow blackish stripes, the middle one more distinct but not reaching back as far as suture. Abdomen dark, margins of tergites yellowish, especially on posterior corners. Legs brownish, femora broadly darker at tips. Wings with venation exactly intermediate between that of *hybrida* and *stictica*: as in *hybrida* a cross-vein is present in middle of cell R_2 , but as in *stictica* Sc_2 is only a short distance beyond base of R_s and 2A is only moderately sinuous at tip (compare fig. 24A, b-f); a distinction from both the allied species is that the second and third posterior cells are equal in length. Spot over base of R_s larger and more sharply defined than in *hybrida*, and almost confluent with the small spot over Sc_2 ; clouds over cross-veins more distinct than in *hybrida*. R_s completely bare, Cu bare almost as far as $m-cu$, and R bare towards base, as in *hybrida*, but $1A$ with small macrotrichia beneath on

distal third, and *2A* with a few macrotrichia near the bend. Wing-length 6-7 mm.

Ross (Dingwall, 2 ♀ taken by J. J. F. X. King, 30.viii.1902, type in the British Museum).

It is not impossible that these specimens may be females of *Psiloconopa novae-zemblaе* Alex., described from four males from Novaya Zembyla; according to the description and figure Alexander's species resembles *scotica* in most respects, but lacks dark stripes on the thorax, has a grey scutellum, and vein *2A* shorter and not at all sinuous at tip. The present species is of considerable interest as affording the connecting-link between *hybrida* and *stictica*; it certainly belongs to *Symplecta* rather than *Psiloconopa*.

E. (S.) *stictica* Mg. (Pl. V, fig. 4.)

Syn. *similis* Schum.

Differs from *hybrida* as follows: Median black line of thorax extending back over scutellum and usually traceable along post-notum. Head with a dark median stripe. Antennal flagellum more or less pale at base. Femora with extreme tips pale. Wings with the dark spots sometimes more distinct though smaller (but very variable; they may be faint or absent); spot over base of *Rs* not spreading much into basal cell. No extra cross-vein in cell *R*₂; second posterior cell longer than third (sometimes only slightly so); tip of *2A* much less deeply waved. All veins bearing macrotrichia almost throughout their length, including vein *2A*, the hairs longer than in *hybrida* and quite evident under a strong lens. Wing-length 3-8 mm.

Hypopygium: Styles large; outer style with two black lobes at right angles; inner style a large black hook.

Common on all marshy coasts; also found less commonly inland.

Brachypterous specimens often occur in salt-marshes, and these may show degeneration of the venation. In normally winged specimens the discal cell varies much in shape and may be open to the third posterior cell.

In some specimens the antennae are entirely dark, and in a few the front femora show a yellowish ring preceding the dark pre-apical ring. Schummel distinguished *stictica* and *similis* on these differences, but there are no accompanying structural distinctions.

Subgenus **TRIMICRA** O.-S.

(Pl. V, fig. 6.)

This subgenus has almost all the characters of *Psiloconopa*, and the propriety of separating it is very questionable. The chief distinguishing character given by Osten-Sacken was that

the last three segments of the antennae are rather abruptly smaller in *Trimicra*, whereas this is not the case in *Psiloconopa*; I have not been able to discover any better distinction between the two, though perhaps it might be better, if they are kept separated, to reserve the name *Psiloconopa* for the shining black species and include in *Trimicra* all the dull-coloured species.

E. (T.) pilipes F. (Pl. V, fig. 6.)

Head light brown with a dark median stripe, antennae and palpi blackish. Thorax dull dark brownish; praescutum with a blackish median stripe; pleurae lighter in parts. Abdomen blackish, lateral margins of tergites yellowish, hypopygium large and yellowish. Legs brownish, femora somewhat swollen apically and with a blackish ring close before the tip. Wings more or less smoky; no distinct stigma, but cross-veins often (not always) with dark clouds. Size very variable; wing-length 6-11 mm.

Sporadically common. Cambs., Hants, Hereford, Herts, Hunts, Salop, Yorks. vii-ix.

This species exhibits rather remarkable variation, which seems to be mainly correlated with size. Large males have the front and hind tibiae and the thickened ends of the hind femora clothed with long, dense, soft hair; small males and all females have this hair short and inconspicuous. Large specimens also tend to have the cross-veins more distinctly clouded than small ones, and there also seems to be some variation in the length of the second anal vein. The different forms may occur at the same time and place.

Subgenus **PSILOCONOPA** Zett.

(Pl. V, fig. 7; text-fig. 23, e.)

Characters essentially as in *Erioptera*, but wing-veins usually with short and scanty hairs (hairs more numerous and longer in *melampodia*); vein M_4 straight, not recurved, so that cell M_3 is widened apically instead of being parallel-sided; $2A$ shorter than in *Erioptera* and almost straight (slightly concave above in *meigeni*).

* **E. (Ps.) meigeni** Zett.

Head blackish, including antennae and palpi. Thorax brightly shining black; scutellum, pronotal angles and upper part of pleurae yellow. Abdomen shining black, posterior margins of segments yellow. Legs black, basal half of front femora and most of middle and hind femora yellow. Wings slightly yellowish; discal cell present, variable in shape. Halteres yellow. Wing-length 4.5-5.5 mm.

Inverness (Aviemore; 1 ♂ in Mr. Collin's collection taken by Col. Yerbury, 4.vi.1904, and 1 ♂ in British Museum taken by J. J. F. X. King, 20.vi.1903).

E. (Ps.) melampodia Lw. (Pl. V, fig. 7.)

Black, including antennae, palpi and legs; head and thorax heavily dusted with grey; praescutum with a pair of brown stripes which are confluent in front. Abdomen with rather long yellowish pubescence. Wings with a dark shade before middle and another below the blackish stigma; discal cell confluent with second posterior. Halteres yellow. Wing-length 6-7 mm.

Herefordshire (Monnow), Inverness (Nethy Bridge).

This has hitherto been referred to *Ilisia*, but both on account of its venation and its non-inverted hypopygium it has more in common with *Psiloconopa*.

In 1926 I erroneously recorded an immature specimen of this species from Scotland as *Ilisia obscuripes* Zett.; the latter, which may possibly occur in Britain, has unmarked wings and a quite different hypopygium from that of *melampodia*.

E. (Ps.) pusilla Schin. (Text-fig. ²³20, e.)

Head blackish behind, grey on front; proboscis yellowish; antennae and palpi black. Thorax dull brownish; praescutum with two ill-defined darker lines which are confluent in front. Abdomen dull brownish, posterior margins of segments narrowly pale. Legs yellowish; tips of femora rather broadly black and thickened; tips of tibiae also darkened. Wings greyish, with faint indications of three darker spots along costa; discal cell usually closed, but sometimes open and confluent with second posterior cell. Wing-length only 4 mm.

Hereford (Monnow Valley). v-vii.

Subgenus **ILISIA** Rond.

Syn. *Acyphona* O.-S.

(Pl. V, figs. 20 and 21; text-fig. 23, a.)

Characters as in *Erioptera*, with the following exceptions: Discal cell present. Vein 2A short and straight. Hypopygium inverted, the tergite ventral.

E. (I.) maculata Mg. (Pl. V, fig. 21; text-fig. 25, a.)

A very distinct species by its wing-markings, the numerous dark spots having more or less obviously paler centres. Thorax light brownish; abdomen yellowish-brown with blackish side-stripes; legs yellow, femora each with a dark brown ring close before the tip, and front femora in addition with a second brown ring before middle. Postnotum bare. Wing-length 6-8 mm.

Hypopygium: Coxites with a pointed projection sternally from base; aedeagus with a pair of simple curved hook-like processes sternally.

Common. Records from Brecon, Cornwall, Devon, Flintshire, Hants, Hereford, Herts, Isle of Wight, Middlesex, Renfrew, Wexford, Yorks.

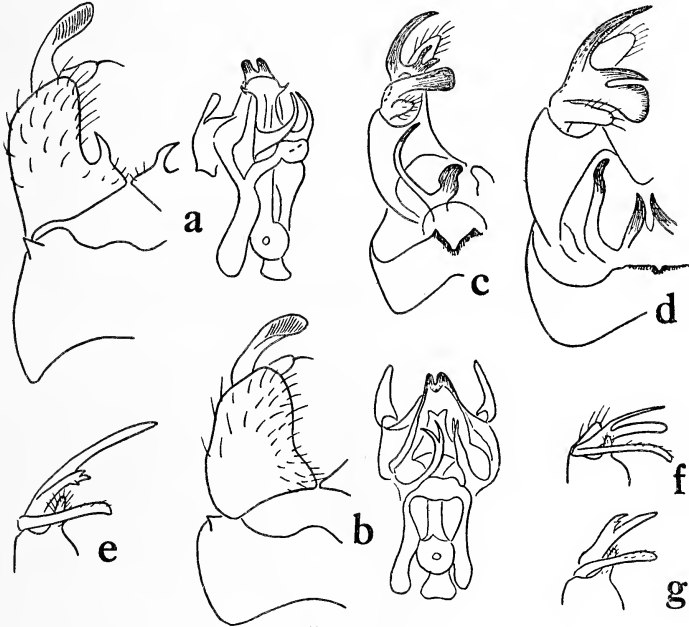


FIG. 25.

a-d, *Ilisia*; a, b, sternite, coxite and styles from beneath, with aedeagus shown separately; c, d, hypopygium from above: a, *maculata*; b, *occoecata*; c, *areolata*; d, *vicina*.

e-g, *Empeda*, tip of coxite and styles from above: e, *nubila*; f, *affinis*; g, *neglecta* (after Laekschewitz, 1927).

E. (I.) *occoecata* Edw. (Pl. V, fig. 20; text-fig. 25, b.)

Very similar to *maculata*, but the wing-markings (though arranged in the same manner) are 'blind,' i.e. uniformly dark, without paler centres; this is particularly noticeable in the case of the spots over Sc_2 and *r-m*, which are smaller and more widely separated than in *maculata*. Body and legs as in *maculata*.

Hypopygium: Coxites without the pointed sternal processes which occur in *maculata*; aedeagus with the sternal hook-like processes bifid, and differing in other details.

Apparently as common as *maculata*. Records from Arran,

Denbighshire, Flintshire, Hants, Hereford, Herts, Kincardine, Lanarkshire, Lancs, Renfrew, Westmorland, Yorks.

E. (1.) areolata Siebke. (Text-figs. 23, a; 25, c.)

Syn. *pallens* Lw.

Light brownish, including legs and halteres, mesonotum and abdominal tergites more or less darkened; antennae dark, with flagellar segments shortly oval; palpi black. Traces of two narrow short brown stripes on posterior part of praescutum and three on scutum. Postnotum bare. Wings clear, with very small discal cell; length 5-6 mm.

Hypopygium: Outer style divided into four.

Glasgow, Oxford, Staffs. v-vi.

E. (1.) vicina Tonn. (Text-fig. 25, d.)

Antennae longer than in *areolata*, the flagellar segments more elongate oval and with longer and denser pubescence; legs extensively blackish; postnotum with a few hairs, arranged more or less in two rows; wings with the discal cell larger.

Hypopygium: Outer style divided into three, lacking one of the two short processes which are found in *areolata*.

Cheshire (Northern Etchels), Glasgow, Inverness (Aviemore), Morayshire (Forres), Westmorland (Temple Sowerby), Yorks (Mulgrave Woods). v-vi, viii-ix.

ORMOSIA Rond.

(including *Rhypholophus* Kol.)

(Pl. V, figs. 17-19; text-figs. 2, 26).

This genus as a whole is distinguished from other Eriopterini, and indeed from almost all other Limoniinae in Britain, by the uniformly and densely hairy wing-membrane, the hairs on the veins not being specially noticeable. The few other species which have the wing-membrane wholly or partially hairy (*Limonia fusca*, *Ula*, *Oxydiscus*, *Dasymolophilus*) are not very likely to be confused with *Ormosia*.

The venation of *Ormosia*, though very variable in some respects in different species, shows one rather constant and characteristic feature: R_2 is rather distinctly turned upwards towards the tip (in other words, the first submarginal cell is trumpet-shaped). Thoracic characters as in *Erioptera*; pteropleura always with a tuft of hairs. Hypopygium always inverted or at least twisted to one side.

Three of the four European subgenera are represented in Britain; the fourth (*Ilisomyia* Rond. = *Oreophila* Lack.) is distinguished by having the open discal cell coalescent with the second posterior cell instead of with the third.

Subgenus **ORMOSIA** Rond., s. str.

(Pl. V, fig. 18; text-fig. 26.)

The following characters are common to the nine British species of the restricted subgenus *Ormosia*: Antennae of ♂ somewhat elongate, longer than those of ♀, with long verticils. Anterior pits of mesonotum very little in front of the humeral pits (as in *Erioptera*). Postnotum with soft hairs. Wings without discal cell, vein M_2 arising from M_1 ; vein $2A$ short and straight.

The northern *fascipennis* Zett., which may well occur in Scotland, differs from all the species here described in possessing a discal cell in the wings and short antennae in the male.

KEY TO BRITISH SPECIES OF ORMOSIA S.STR.

1. Thorax all dark greyish 2.
Thorax yellowish or light brownish, at least in part 6.
2. Praescutum with a narrow median brown stripe *lineata* Mcq.
Praescutum unstriped 3.
3. Pubescence of hind tibiae and tarsi practically all blackish
..... *nodulosa* Mcq.; *depilata* nom.n.
Pubescence of hind tarsi mainly or all whitish 4.
4. Pubescence on distal part of hind tibia and on tip of hind tarsi blackish
..... *hederae* Curt.
Pubescence of hind tarsi all whitish or pale 5.
5. Pubescence on tip of hind tibia dark; smaller, spring species
..... *aciculata* Edw.
Pubescence on whole of hind tibia pale; larger, autumn species
..... *albitibia* Edw.
6. Pleurae dark in middle *bicornis* de Meij.
Pleurae all yellowish 7.
7. Abdomen dark; larger species *similis* Staeg.
Abdomen yellow; very small species *pseudosimilis* Lundst.

O. (O.) lineata Mcq. (Text-fig. 26, c.)Syn. ? *apparens* Walk. (type lost).

Antennae of ♂ as in *nodulosa*. Thorax dark grey, praescutum with a narrow dark brown line running the whole length. Abdomen blackish. Legs dark. Wings with clearer membrane and darker veins than in the other species, stigma distinct, cross-veins narrowly clouded; cell M_1 variable in length but often only a little longer than its stem and usually much wider at base than in the other species. Wing-length 4.5-6 mm.

Hypopygium: Tergite small, without hair-tuft; outer style a simple, bare black hook; inner style a short bare blade.

Common. Cornwall, Denbigh, Dumbarton, Hants, Herts, Lanarkshire, Middlesex, Notts, Salop, Surrey.

O. (O.) nodulosa (Mcq.) de Meij. (Text-fig. 26, f.)

Antennae of ♂ somewhat longer than head and thorax together; segments of flagellum pear-shaped, moderately swollen at base, the narrower terminal portion shorter than the stouter part. Thorax dark greyish, sometimes with a slight reddish tinge, mesonotum quite unstriped, pleurae not lighter than dorsum. Legs dark; almost all the pubescence of hind tibiae and tarsi blackish; wings with ill-defined and quite inconspicuous stigma, but the darkened area usually filling whole of outer marginal cell; no darkening over cross-veins; cell M_1 usually at least twice as long as its stem. Wing-length 4.5-6 mm.

Hypopygium: Ninth tergite with a conspicuous tuft of long yellow hair at distal end of broad portion, beyond the tuft a long narrow projecting portion which is deeply split into two and reaches to the tips of the yellow hairs; outer style short, the clubbed tip set with numerous close-set rows of minute spicules; inner style pale, simple.

Common. England, Wales, Scotland, Ireland. v-vii.

O. (O.) depilata nom. n. (Text-fig. 26, e.)

Syn. *hederae* de Meij. nec Curt.

Closely resembles *nodulosa*; antennae of ♂ precisely similar.

Hypopygium: Ninth tergite smaller than in *nodulosa*, without hair-tuft, terminal projection short; styles as in *nodulosa*, but aedeagus differently constructed.

Arran, Cheshire, Cornwall, Hants, Nairn, Ross, Salop, Sutherland, Yorks. v-vi.

O. clavata Tonn., a species extremely similar to *depilata*, is very likely to occur in Britain; it differs from *depilata* chiefly if not solely in the structure of the inner parts of the hypopygium, especially the presence of a pair of elongate parameres.

O. (O.) hederae Curt. (sec. typ.) (Text-fig. 26, a.)

Syn. *uncinata* de Meij.

Antennae of ♂ fully twice as long as thorax (longer than in *nodulosa*); flagellar segments much swollen, with narrow necks which are about as long as the basal portion. Thorax dark ash-grey, never with any reddish tinge, mesonotum unstriped. Legs largely dark, but the first two hind tarsal segments clothed with whitish hair above, contrasting strongly (especially in life) with the dark apical portion of tibia. Wings much as in *nodulosa*, but cell M_1 usually somewhat shorter, about half as long again as its stem; stigma rather more distinct than in *nodulosa*, but hardly extending beyond tip of R_1 and always leaving a clear area at tip of outer marginal cell.

Hypopygium: Ninth tergite small, without hair-tuft and without terminal projection; styles both blackened, the outer one forming a sharp-pointed hook, usually clearly visible in dry specimens.

Common. England, Scotland, Ireland. v-vi, viii, x.

Examination of Curtis' type confirms the indication given by his description and figure of the male antenna as to the identity of his species, and unfortunately necessitates the above change of designation.

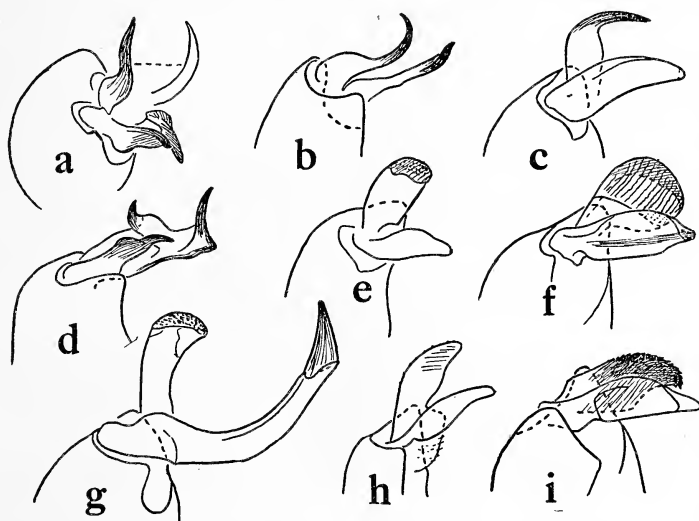


FIG. 26.

Ormosia s.str.; tip of coxite and styles from above: a, *hederæ* (*uncinata*); b, *aciculata*; c, *lineata*; d, *bicornis*; e, *depilata*; f, *nodulosa*; g, *albitibia*; h, *pseudosimilis*; i, *similis*.

O. (O.) aciculata Edw. (Text-fig. 26, b.)

Very similar to *hederæ*; antennae of ♂ at least equally long and of similar form; hind tarsi with all the pubescence whitish (not only that on the first two segments); thorax less ashy-grey than in *hederæ*; wing-stigma more resembling that of *nodulosa*.

Hypopygium: Ninth tergite with a long, slender terminal portion, somewhat as in *nodulosa*, and also resembling *nodulosa* in carrying a tuft of yellow hairs, but in this species the yellow hairs are on the terminal portion and not on the broad basal portion of the tergite; both styles slender, curved, bare, black, pointed.

Cheshire (Cotterill Clough), Inverness (Aviemore), Lanark (Braidwood, Gorge of Avon), Yorks (Stonesdale and Great Blake Ghyll). v-vi.

O. (O.) albitibia Edw. (Pl. V, fig. 18; text-fig. 26, g.)

Antennae of ♂ almost as in *hederae*, but slightly shorter and basal portions of segments somewhat less swollen. Mesonotum dark brownish-grey, with a slight ochreous tinge on sides of praescutum; pleurae dark grey. Hind legs with all the dorsal pubescence on the tibiae as well as on the tarsus pale. Wings as in *nodulosa*, length 5.7 mm.

Hypopygium: Ninth tergite with a patch of long yellow hair which is much more diffuse than in *nodulosa*, slender terminal portion pubescent only; outer style short and clubbed, as in *nodulosa*; inner style long, recurved, round in section except for a long, black terminal point (these structures always clearly visible in dry specimens).

Carnarvon, Elgin, Hereford, Inverness, Lancs, Montgomery, Salop, Somerset, Sussex, Wilts, Worcs., Yorks. viii-ix.

O. (O.) bicornis de Meij. (Text-fig. 26, d.)

Antennae of ♂ much as in *hederae*, but first few flagellar segments rather longer and more slender, so that antenna is as long as whole body. Thorax mostly light brownish; mesonotum darker except at sides and pleurae darker in middle. Abdomen blackish. Legs light brownish, pubescence largely pale. Wings as in *nodulosa*.

Hypopygium: Tergite without conspicuous hair-tuft; outer (ventral) style with two black teeth, one at middle and one at tip; inner (dorsal) style much smaller.

Glos, Herts, Oxon, Yorks. ix.

O. (O.) similis Staeg. (Text-fig. 26, i.)

Antennae of ♂ as in *bicornis*. Thorax almost entirely yellowish-brown, mesonotum somewhat darkened in middle. Abdomen dark brownish with yellowish hypopygium. Legs light brownish. Wings as broad and densely hairy as usual; venation as in *nodulosa*; length 5.65 mm.

Hypopygium: Tergite without conspicuous hair-tuft, styles somewhat as in *nodulosa*.

Moorlands. Denbigh, Durham (Teesdale), Elgin (Logie), Lewis, Midlothian, Perth (Glen Lochay), Ross. vi-ix.

Charbonnier's record from Cheddar needs confirmation.

O. (O.) pseudosimilis Lundst. (Text-fig. 26, h.)

Differs from all other British species of the subgenus in the yellowish colour of both thorax and abdomen. Antennae of ♂ of the usual length, but flagellar segments almost cylindrical, only slightly widened in the middle. Wings narrower and paler than in the other species, and with finer and less dense hair on the membrane; length 4 mm.

Hypopygium: No hair-tuft on tergite; styles short, simple, pale and bare; aedeagus large and usually exerted; penis divided near base into a dorsal and ventral branch, the ventral branch forked some distance before the tip, the two branches of the fork if not also the dorsal branch with a terminal opening.

Moorlands. Durham, Inverness, Lancs, Merioneth, Salop, Sutherland, Westmorland, Yorks.

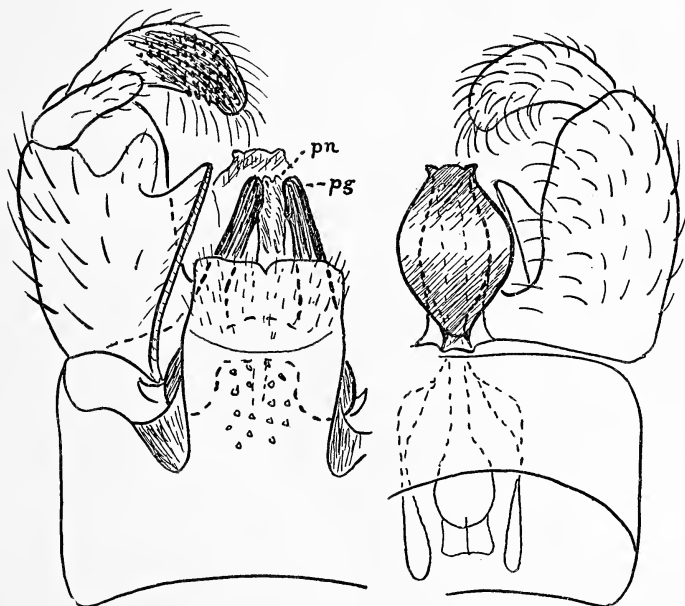


FIG. 27.

Ormosia (Scleroprocta) danica Nielsen. Hypopygium from above and below.

Subgenus **SCLEROPROCTA** nov.

(Pl. V, fig. 17; text-fig. 27.)

The two species *sororcula* Zett. and *danica* Nielsen seem to deserve at least subgeneric separation from both *Ormosia* and *Rhypholophus* for three reasons: (1) the anterior pits of the praescutum are placed far forwards, well in front of the humeral pits, thus differing from all other members of the subtribe Eriopteraria; (2) the postnotum is completely bare; and (3) the hypopygium is of a completely different type, the anal segment being highly sclerotised instead of membranous as in nearly all other Limoniinae, and there is a remarkable sclerotised structure between the bases of the coxites sternally.

These two species also differ from other British species of *Ormosia* in having a closed discal cell, but this cannot be regarded as a subgeneric character, as a discal cell is also possessed by other species (e.g. *phryganopterus*, which is a *Rhypholophus*; and *fascipennis*, which seems to be a true *Ormosia*, though with short ♂ antennae).

Subgenotype: *Ormosia danica* Nielsen.

O. (S.) sororcula Zett.

Syn. *pentagonalis* Lw.

Antennae alike in the two sexes, about as long as thorax. Mesonotum brownish-grey, with a narrow median dark line faintly indicated. Legs light brownish, tips of femora darker. Wings greyish, stigma inconspicuous; *m-cu* well before base of discal cell, which is rather short. Wing-length 6-7 mm.

Hypopygium: Ninth tergite with a sharp median spine; anal segment small; outer style with dense black spinules on one side; inner style small, pale, hairy. (See figure by Lack-schewitz, 1933.)

Derbyshire (Millersdale), Flintshire (Ffrith). vi.

* **O. (S.) danica** Nielsen. (Pl. V, fig. 17; text-fig. 27.)

Antennae somewhat longer in ♂ than in ♀, and even in ♀ fully as long as head and thorax together. Mesonotum dark grey, without any trace of median line. Legs more extensively dark than in *sororcula*. Wings clearer than in *sororcula*, but stigma more distinct; *m-cu* just at base of discal cell, which is somewhat longer than in *sororcula*.

Hypopygium: Ninth tergite without spine; anal segment very large; inter-coxal structure differently formed; style similar to *sororcula*.

Arran, E. Devon (Edge Barton, Rousdon), Inverness (Aviemore), Merioneth (Llwyngwril), Perth (Glen Lochay), Yorks (Bilsdale). v-vi.

Subgenus **RHYPHOLOPHUS** Kol.

Syn. *Dasyptera* Schin.

(Pl. V, fig. 19.)

I have previously distinguished *Rhypholophus* from *Ormosia* s.str. by the long, sinuous vein 2A in the former; the distinction is however not always clear-cut, some species having this vein of intermediate length. Another striking character shared by the three British species of *Rhypholophus* is the structure of the penis, which is deeply split into two slender reflexed tubes, each with a minute terminal opening. A very similar type of penis is

possessed by the genotype of *Rhypholophus* (*phryganopterus* Kol.), specimens of which I have examined, but I have not seen anything in the least resembling it in any species of *Ormosia* s.str., in which the penis seems, as usual, to have a single terminal opening.*

In this subgenus the discal cell may be present (as in *phryganopterus*) or absent (as in the three British species). The antennae of the male are always short like those of the female.

O. (R.) varia Mg. (Pl. V, fig. 19.)

Thorax: Middle area of praescutum with two brownish stripes which diverge slightly in front but have no short stripe between them on front margin. Wings with a mottled appearance due to patches of dark hair; stigma and a patch over tip of vein R_2 noticeably dark, and between them a conspicuous patch of whitish hair; dark areas over cross-veins and in middle of upper basal cell. Legs brownish, tips of femora not noticeably darkened. Wing-length 5.5-7.5 mm.

Hypopygium: The black outer style divided apically into two conical lobes, the inner of which is somewhat longer than the outer but blunt-tipped; penis with a pair of small pointed pale horns at right angles to shaft near base.

Probably common. Argyll, Cambs, Inverness, Morayshire, Notts, Salop, Surrey, Yorks. viii-ix.

O. (R.) bifurcata Goet.

Thorax: Middle area of praescutum with two brownish stripes which are rather widely divergent in front and have between them a short median stripe extending from front margin to anterior pits (all these stripes sometimes faint). Wings much less variegated than in *varia*; no dark area in upper basal cell; dark area over tip of R_2 less obvious. Legs brownish, tips of femora not obviously darkened. Wing-length 6-8.5 mm.

Hypopygium: The large black outer style divided apically into two equal conical lobes, both rather blunt-tipped; penis as in *varius*.

Probably as common as *varia*, but hitherto confused with that species and with *haemorrhoidalis*. Cambs, Hereford, Herts, Lanarkshire, Montgomery, Salop, Somerset. ix.

O. (R.) haemorrhoidalis Zett.

Thorax unstriped or with only the short median anterior stripe. Wings appearing lighter than in *varia* and *bifurcatus*, most of the hair yellowish. Legs yellowish-brown, tips of femora blackish. Wing-length 7.5-8.5 mm.

* But compare the remarkable penis of *O. pseudosimilis*.

Hypopygium: The inner lobe of the black outer style produced into a long point; shaft of penis smooth, without the pair of horns which are present in the other two species.

Hereford, Herts, Inverness, Salop, Yorks. viii-ix.

MOLOPHILUS Curt.

(Pl. V, fig. 9; text-figs. 23, f, g; 28-30.)

In this genus the hair on the wing-veins is so long as to tend to obscure the venation, the hairs of adjacent veins touching or overlapping, and the fringe is also unusually long, but the wing-membrane is bare. The venation is also very distinctive, differing from that of other Eriopterini (and from most other Tipulidae) in the retraction of the main points of forking and the *m-cu* cross-vein to the middle of the wing, resulting in the apical cells of the wing being of unusual length. A second peculiarity (shared only by the allied *Dasymolophilus* and by a few Pediciini) is the termination of *Rs* in the first instead of the second submarginal cell. The thoracic structure shows, however, that in spite of these peculiarities the genus is nearly related to *Erioptera*. The pteropleurae bear a tuft of long hairs, but there are no hairs on the postnotum.

Molophilus further differs from most other Tipulidae and resembles *Ormosia* and a few other genera of Eriopterini in having the hypopygium inverted, so that the tergite occupies a ventral position; this occurs consistently in all species of the genus shortly after emergence from the pupa. A peculiarity of structure in the hypopygium is that one of the two styles on each coxite articulates in a vertical plane (instead of in a plane horizontal or slightly oblique to the axis of the body as usual) and can be folded into a deep longitudinal slit which is developed on the anal (morphologically dorsal but actually ventral) surface of the coxite; the second style is variable in development and in a few species is reduced to a mere knob, but is never entirely absent in any European species.

The numerous species are mainly distinguished by hypopygial characters, especially the form of the styles and of various lobes on the coxites. These features are usually fairly readily discernible in the dry specimen, without dissection, under a binocular microscope. The accompanying figures (all drawn to the same scale) represent the coxite and its appendages in side-view; *a* and *b* are outer and inner sternal (actually dorsal) lobes of the coxite, *c* and *d* outer and inner tergal or anal (actually ventral) lobes, *e* and *f* the two styles.

The great majority of the known European species have been found in Britain, but five more have been described by Lackschewitz (1925, 1927, 1935); of these *M. maurus* is figured here for comparison with the British species, the other four

(*pullus*, *oldenbergi*, *priapus* and *nodicornis*) being unknown to me. One other species (*scutellatus*) was described by Goetghebuer (1929) and is also unknown to me. Two further apparently undescribed species are represented in the British Museum collection, and I take this opportunity of describing them:

Molophilus rothschildi sp. n. (Text-fig. 29, f.)

Head, thorax and abdomen blackish-grey, but shoulders and scutellum rather light yellowish. Thorax dull, both above and on pleurae. Abdomen with rather dense yellow hair. Antennae and legs almost entirely blackish-brown, only the trochanters lighter. Wings with uniformly dark brown hair. Wing-length 5 mm.

Hypopygium: Coxite large, especially sternally; *a* and *b* not well separated; styles both somewhat bent at tips and both entirely pale, *f* somewhat shorter than *e* and thicker except distally.

S. FRANCE: Lautaret, Haut Dauphiné, viii.1908, 1 ♂ (*Lord Rothschild*).

This resembles *M. obscurus* more than any other British species in colouring, but it is larger and with longer legs. It is evidently very closely related to *M. oldenbergi* Lack. of Italy, which has shining pleurae and differs in regard to the shape of the coxite and in having both styles black.

M. scutellatus Goet., according to the description, must be very similar to *rothschildi*, and the unique male type was also taken on the Col du Lauteret, 2,080 m. I cannot, however, identify *rothschildi* with *scutellatus* because Goetghebuer describes and figures the hypopygium as having a pair of long black rods lying one on each side of the penis, and these structures are certainly not present in *rothschildi*.

Molophilus pietaini sp. n. (Text-fig. 30, g.)

Rather pale brownish-yellow, including head and abdomen (head may appear dark greyish when discoloured). Palpi and antennal flagellum blackish. Legs yellow, tips of femora and tibiae rather broadly blackish, tarsi black. Wing-hair mostly greyish. Wing-length 3.5 mm.

Hypopygium: Intermediate in structure between *ochrescens*, *obscurus* and *occultus*; lobe *b* not blackened; style *e* rudimentary, *f* sickle-shaped, broad at base, distal part smooth.

SPAIN: Guadarrama Mts., 6-8,000 ft., 9 ♂, 2 ♀ (*B. P. Uvarov*, viii.1927, and *F. W. Edwards*, ix.1935).

I have pleasure in dedicating this insect to my friend Dr. C. Bolivar y Pietain, in whose company some of the specimens were collected near the biological station of the Madrid Museum.

KEY TO BRITISH SPECIES OF *MOLOPHILUS*.

1. Body all black, including scutellum and hypopygium 2.
- Body not all black 5.
2. Flightless, wings abbreviated (σ ♀) *ater* Mg.
- Wings fully developed 3.
3. Legs all black *niger* Goet.
- Legs not all black 4.
4. Only coxae and bases of femora yellowish *czizeki* Lack.
- Legs mainly light brownish *bihamatus* de Meij.
5. Dark grey, with yellowish scutellum *obscurus* Mg.
- Thorax mainly or all light brown or yellow 6.
6. Pleurae with a brown stripe (sometimes faint) *pleuralis* de Meij.
- Pleurae quite unstriped, pale 7.
7. Vein 2a ending before *m-cu* *pusillus* Edw.
- Vein 2a ending below or beyond *m-cu* 8.
8. Thorax light brownish, abdomen dark, head blackish 9.
- Thorax almost uniformly light yellowish-brown or yellow 10.
9. Antennae all dark *occultus* de Meij. and 4 other species.
- Antennae with scape more or less pale *griseus* Mg.
10. Abdomen darkened, at least in σ , wing-hair dark
..... *serpentiger* nom.n.; *corniger* de Meij.
- Abdomen yellow like thorax 11.
11. Head and wing-hair grey *cinereifrons* de Meij.; *ochrescens* nom.n.;
flavus Goet.
- Head and wing-hair yellow *appendiculatus* Staeg.; *ochraceus* Mg.;
medius de Meij.

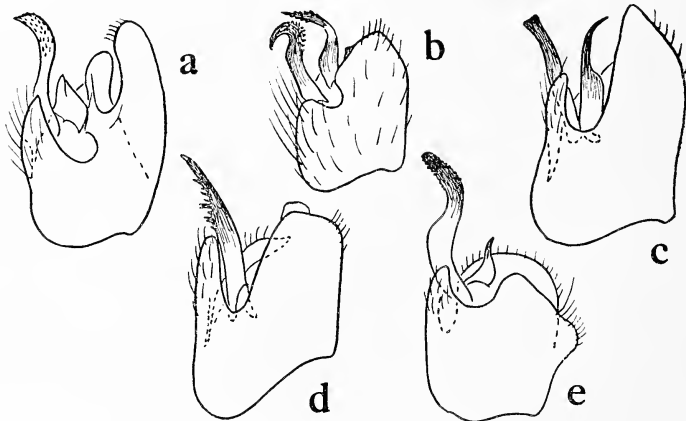


FIG. 28.

Molophilus (black species). Coxite and styles from right side.
a, : *ater*; b, *niger*; c, *maurus*; d, *czizeki*; e, *bihamatus*.

M. ater Mg. (Text-fig. 28, a.)Syn. *brevipennis* Curt.

Entirely black, including whole of antennae and legs and even the shoulders, but knobs of halteres white. Thorax shining. Legs rather stout. Wings shorter than abdomen and useless for

flying (in both sexes, not only in ♂ as sometimes quoted). Abdomen and wings with black hair. Wing about 2 mm.

Hypopygium: Sternal lobe *a* of coxite very large; style *e* small, triangular; *f* long, somewhat clubbed and shagreened.

Abundant in peaty areas. Devon and Hants to Sutherland; Ireland. vi.

M. niger Goet. (Text-fig. 28, b.)

Almost entirely black, including the whole of antennae and legs, but posterior pronotal angles, halteres and extreme wing-base whitish. Thorax somewhat shining, but mesonotum with slight grey dusting. Abdomen with yellow hair. Legs slender. Wings fully developed, 3.5-4 mm.

Hypopygium small; lobes *a* and *c* of coxite scarcely developed; *b* a blackened point; style *e* long, curved, black, with an unchitinised area in middle; *f* a strong black hook with fine serrations on outer margin.

Devon (Sidmouth; common in a small area by river bank), Dumbarton (Bonhill), Hants (New Forest), Somerset (Tockington, Fishponds).

M. czizeki Lack. (Text-fig. 28, d.)

Body almost all black, but head and thorax with slight grey dusting, scarcely shining. Posterior pronotum whitish. Abdomen with yellow hair. Legs slender, mainly black, but coxae brownish, trochanters and bases of femora yellowish. Halteres entirely pale yellow. Wing 5 mm.

Hypopygium: Coxite broad, truncate; lobe *a* scarcely developed, *b* a small pale flap, *c* rather long; style *e* vestigial, *f* a long black pointed blade bearing teeth on one side; penis remarkable in being long, broad and flat, not a slender tube as in the other species, with a tooth on each side before tip.

Brecon (Llangynidr), S.W. Ireland (Killarney).

Other European species resembling *niger* and *czizeki*, which may occur in Britain, are *maurus* Lack. and *pullus* Lack. These are very similar, with rather pointed coxite and both styles well developed and smooth.

M. bihamatus de Meij. (Text-fig. 28, e.)

Body almost all black, thorax scarcely shining, with brownish dusting when seen from in front. Posterior pronotum yellowish. Abdomen with pale hair. Legs not very slender and mostly light brownish, femora not much darker distally. Halteres yellowish, knob somewhat darkened. Wing-length 3-4 mm.

Hypopygium: Lobe *a* of coxite small and of unusual shape; *b* absent, *c* small, *d* large; style *e* short but pointed, *f* long, somewhat sickle-shaped, blackened on distal half

S.W. Ireland (Killarney). Also ♀ only from Inverness (Loch Morlich), Cambs (Chippenham) and Norfolk (Martham). My previous record of a female from the New Forest referred not to this species but to *niger*.

M. obscurus Mg. (Text-figs. 23, f; 29, a.)

Syn. *scutellaris* Mg., *crassipes* Curt. (sec. typ.).

Head dark grey; antennae all dark. Thorax mainly blackish with greyish dusting and quite dull; posterior pronotum and scutellum yellow; in some specimens (as in Curtis' type of *crassipes*) there is also a small yellowish area on each side of praescutum in front and a variable amount of yellow on the pleurae. Abdomen blackish with brownish-yellow hypopygium. Legs rather stout, mainly blackish. Wings dark, yellowish at base; length 3-4 mm.

Hypopygium: Lobe *a* of coxite rather large, *b* forming a stout, blunt, black hook; *c* long, with pointed and blackened tip; style *e* small, almost triangular; *f* long, pointed, black, serrate on outer side. It is noteworthy that the hypopygium bears more resemblance to *pieltaini* than to any other British species, although the two species are much more distinct in colouring than is the case with most.

Abundant.

Three other European species (*scutellatus*, *oldenbergi* and *rothschildi*) have similar colouring (dark grey thorax with yellow scutellum) but are larger and with completely different hypopygium.

M. pleuralis de Meij. (Text-fig. 29, g.)

Head mainly yellowish; antennal flagellum dark, scape yellowish. Thorax dull light brownish, pronotum yellow; pleurae yellowish with a broad but ill-defined brown or dark brown stripe from neck to base of abdomen, very distinct in life. Abdomen dark brownish, hypopygium pale. Legs slender, light brownish. Wings rather pale. Knob of halteres light brownish. Wing-length about 4-5 mm.

Hypopygium: Coxite elongate, very large in comparison with the small terminal structures; lobe *a* rather large, *b* and *c* small and pointed but not blackened; style *e* forming a small, black, sharp-pointed hook; *f* minute and pale (a unique feature of this species).

Arran (Brodick), Cambs (Wicken), Devon (Slapton, Dawlish), Glasgow (Possil); Co. Mayo (Ballin Lough and Westport).

M. occultus de Meij. (Text-fig. 29, h.)

Head blackish-grey; antennae dark, scape not obviously lighter. Thorax dull light brownish, shoulders and scutellum more yellowish but not conspicuously so. Abdomen dark brown,

hypopygium lighter. Legs of moderate length and thickness, brownish, femora somewhat darkened distally. Wings with dark hair, paler at base. Halteres yellowish. Wing-length about 5 mm.

Hypopygium: Coxite rather short, lobe *a* terminal, small, darkened; *b* a small black tooth; *c* rather long, pale; *d* long, pointed, fringed on one side; style *e* triangular, black; *f* long, black, sickle-shaped, denticulate on the concave side.

Probably common. Records from Argyll, Carnarvon, Cheshire, Devon, Dorset, Hants, Hunts, Inverness, Lancs, Perth and Yorks.

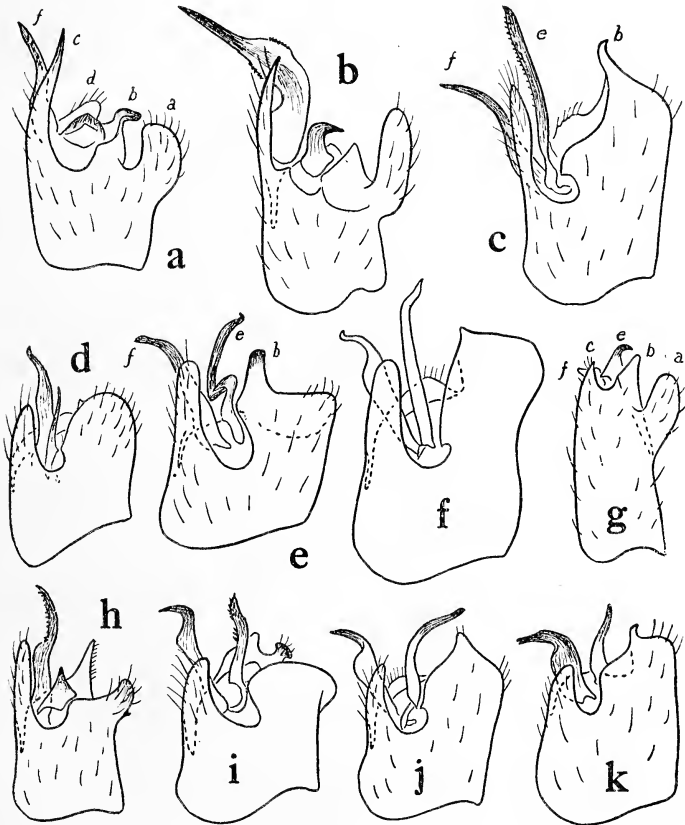


FIG. 29.

Molophilus (brownish and brownish-yellow species). Coxite and styles from right side (to same scale as fig. 28). a, *obscurus*; b, *griseus*; c, *corniger*; d, *undulatus*; e, *serpentiger*; f, *rothschildi*; g, *pleuralis*; h, *ocellus*; i, *propinquus* (*gladius*); j, *curvatus*; k, *bifidus*.

Another European species (*pieltaini*, p.) has a similar hypopygium but differs obviously in being entirely pale yellow in colour.

M. curvatus Tonn. (Text-fig. 29, j.)

Closely resembles *occultus*.

Hypopygium: Coxite somewhat pointed, lobes *a* and *b* not well marked; *c* moderate; styles *e* and *f* about equal in length, tips blackened and curving in opposite directions, smooth.

Arran, Denbighshire (Llangollen), Hants (New Forest), Lancs (Clayton-le-Dale), Westmorland (Windermere).

M. propinquus Egg. (sec. typ.). (Text-fig. 29, i.)

Syn. *gladius* de Meij.

Closely resembles *occultus*.

Hypopygium of similar type to *curvatus*, but coxite differently shaped, lobe *b* represented by a blackened knob; style *e* covered with fine spicules.

Hants (Matley Bog), Inverness (Aviemore), Lanark (Frankfield), Merioneth (Barmouth), Notts (Oxton), Perthshire (Glen Lyon), Ross (Dingwall), Yorks (Austwick).

Lackschewitz examined Egger's type and reported to me (*in litt.*) that it was this species and not the one determined by Verrall and de Meijere as *propinquus*.

M. undulatus Tonn. (Text-fig. 29, d.)

Closely resembles *occultus*.

Hypopygium: Coxite short, lobe *a* absent, *b* represented by a small point, *c* moderate; styles scarcely darkened, *e* very slender and short, *f* stouter, much longer and rather wavy, both pointed.

Morayshire (Forres, 1 ♂), Yorks (Masham, 1 ♂).

M. bifidus Goet. (Text-fig. 29, k.)

Closely resembles *occultus*.

Hypopygium rather large; lobe *a* of coxite hardly indicated, *b* represented by a small pale point, *c* short; style *e* of moderate length, pointed, not blackened; *f* strong, black, somewhat sickle-shaped, bifid at tip; tegmen of aedeagus very distinctive, almost as long as penis, black, with a pair of strong black teeth at base.

Probably common. Records from Beds., Cambs, Devon, Herts, Salop.

M. griseus Mg. (Pl. V, fig. 9; text-fig. 29, b.)Syn. *bifilatus* Verr.

Head brownish or greyish-brown, antennae dark, with scape more or less pale. Thorax dull light brownish, shoulders and scutellum yellowish. Abdomen brownish, hypopygium lighter. Legs long and rather slender, light brownish, femora not much darkened towards tips. Wings with dark hair, not obviously paler at base. Size rather variable, average wing-length 5-6 mm., range 3-7 mm.

Hypopygium: Lobe *a* of coxite large, *b* triangular, pale, *c* very long, slender, pale; style *e* short but curved, pointed and black, *f* long, black, flattened, with serrate expansions in middle.

Abundant.

I have examined the specimens of *griseus* in Meigen's collection in Paris, and find they belong to this species, as already suspected by Verrall.

M. pusillus Edw. (Text-fig. 23, g.)

Head blackish; antennae all dark. Thorax and abdomen uniformly brownish-yellow, abdomen scarcely darker than thorax. Legs light brownish, only the tarsi somewhat darker. Wings with dark hair, fringe unusually long. Venation differing in several respects from the other species: cross-vein *r* nearer base of R_2 ; *m-cu* before or scarcely beyond fork of *M*; $2A$ shorter and straighter, ending before *m-cu*. Wing-length 3.5 mm.

Ayrshire (Dreghorn).

Male unknown; no further specimens have been taken since the species was described.

M. serpentiger nom. n. (Text-fig. 29, e.)Syn. *propinquus* Verr., de Meij., nec Egger.

Head blackish or dark grey. Antennal flagellum dark, scape more or less pale. Thorax almost uniformly yellowish, mesonotum scarcely darkened. Abdomen in ♂ brown, hypopygium yellow; in ♀ often lighter. Legs slender, mostly yellowish-brown, femora darkened towards tips. Wings with hair and veins rather dark greyish. Halteres yellowish. Wing-length about 5 mm.

Hypopygium: Remarkable for the form of style *e*, which is very long, black, smooth, with a strong double bend, very easily seen with a hand-lens when the abdomen is seen in end view; lobe *a* of coxite hardly indicated, *b* thumb-like, black at tip, *c* moderately long; style *f* long, black, blunt-tipped.

Common. Records from Beds., Devon, Flintshire, Hants, Herts, Kerry, Renfrew, Surrey, Sussex, Westmorland.

This species requires renaming, since Lachschewitz has shown that it was wrongly determined as *propinquus*. The name now suggested refers to the sinuous style.

M. corniger de Meij. (Text-fig. 29, c.)

Closely resembles *serpentiger*.

Hypopygium: Coxite large, produced apically into a finger-like projection probably representing lobe *b*; lobe *c* long, pale, pointed, hairy at tip; style *e* remarkably long, straight, black, with fine spicules along one side; *f* also long, black, pointed, but somewhat shorter than *e*.

Hereford (Stoke Wood and Haugh Wood), Morayshire (Forres), Yorks (Pateley Bridge and Mulgrave Woods). Perhaps overlooked elsewhere through confusion with *appendiculatus*.

M. cinereifrons de Meij. (Text-fig. 30, e.)

Head greyish; antennal flagellum dark, scape more or less pale. Thorax almost uniformly yellowish or light yellowish-brown, abdomen not much darker than thorax. Legs brownish, femora lighter towards base. Wings with hair and veins greyish. Halteres yellowish. Wing-length about 5-6 mm.

Hypopygium: Coxite rather short and broad, lobes small, *c* quite short; styles black, *e* rather long, almost straight, pointed, *f* somewhat longer, stouter blunt-tipped; tegmen of aedeagus differing from all the other species except *bifidus* in being almost as long as penis, and from *bifidus* in being pale, without teeth at base.

Common. Records from Beds., Devon, Flintshire, Glamorgan, Herts, Lancs, Middlesex, Norfolk, Sutherland, Yorks.

M. ochrescens nom. n. (Text-fig. 30, c.)

Syn. *ochraceus* de Meij., nec Mg.

Head greyish; antennal flagellum entirely dark or only indistinctly yellowish at base. Thorax uniformly yellow, abdomen also yellow but sometimes slightly darker than thorax. Legs mainly dark. Wings with hair and veins greyish. Wing-length 4-5 mm.

Hypopygium small; lobe *a* of coxite small, *b* small and black, *c* short; style *e* vestigial, *f* long, curved apically and blunt-tipped, smooth, black.

Argyllshire (Bonawe), Midlothian (Balerno), Suffolk (Monk's Soham), Yorks (Masham, Bishopdale, Mulgrave Woods).

All the British and Dutch specimens I have seen have the head grey and the flagellum more or less completely darkened; I therefore consider that de Meijere must have been in error in his determination (see below under *M. ochraceus*) and rename the species as above.

M. flavus Goet. (Text-fig. 30, f.)

Head greyish, antennae more or less pale at base. Thorax and abdomen uniformly orange-yellow. Legs much as in *ochraceus*. Wings with greyish hair, length 5-6 mm.

Hypopygium: Coxite short and broad; lobe *a* absent, *b* small, black, *c* moderate; style *e* rather long and stout, wavy, black; *f* rather long, nearly straight, extreme tip bent at right angles, black on distal half or more.

Locally common. Records from Arran, Bucks, Carnarvon, Cromarty, Kerry, Merioneth, Montgomery, Morayshire, Perth, Salop, Westmorland.

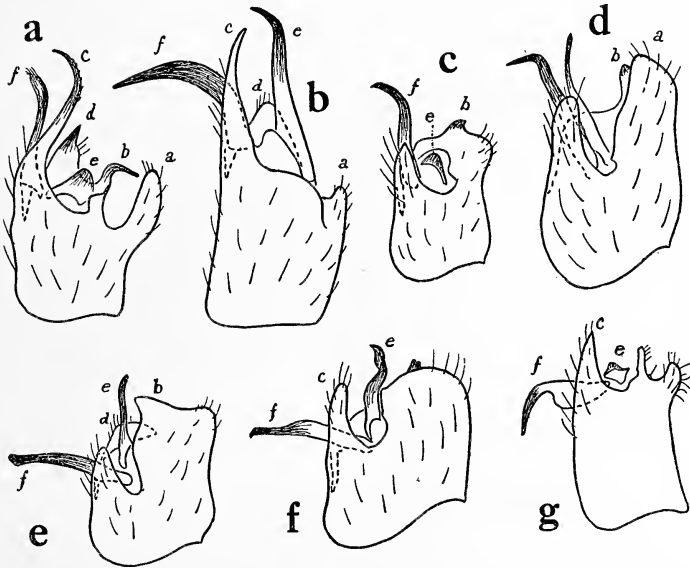


FIG. 30.

Molophilus (yellow species). Coxite and styles from right side (to same scale as fig. 28). *a*, *ochraceus*; *b*, *appendiculatus* (*armatus*); *c*, *ochrescens*; *d*, *medius*; *e*, *cinereifrons*; *f*, *flavus*; *g*, *pieltaini*.

M. ochraceus Mg. (Text-fig. 30, a.)

Syn. *appendiculatus* Verr., de Meij. (nec Staeger).

Head yellow; antennal scape and (except in discoloured specimens) the basal half or more of flagellum pale yellow. Thorax and abdomen uniformly pale yellow, abdomen not darker than thorax. Legs in fresh examples mainly blackish, front and middle femora yellow at base, hind femora yellow with tip rather broadly blackish; in old, immature or worn specimens the legs may be paler, hind tibia sometimes yellowish with dark tip.

Wings pale yellowish, including veins and much of the hair; length 5-6 mm.

Hypopygium remarkably distinct: lobe *a* of coxite large; *b* forming a strong and rather long pointed black hook; *c* extremely long; *d* with a blackened point; style *e* rudimentary; *f* long, black, with a tuft of fine short hairs at tip.

Common. Records from Devon, Flintshire, Herts, Inverness, Middlesex, Norfolk, Yorks.

In his original description Meigen emphasizes the colour of the antennae, which he describes as 'entirely yellow, rarely somewhat brownish at the tips,' and describes the wings as pale yellow. These statements do not apply to the species determined by de Meijere as *ochraceus*, but are nearly correct for the one that author determined as *appendiculatus*, which is the only one of the yellow species of *Molophilus* in this country which normally has the antennal flagellum mainly yellow, the only other species which might come into consideration being *appendiculatus (armatus)* and *medius*. Unfortunately Meigen's types in Paris are fragmentary and indecisive, but I propose to use his name for this species, as no other is available. Lackschewitz expressed the opinion that the original *ochraceus* was probably either '*appendiculatus*' or *medius*, which are two of the commonest species.

Judging from their remarks Staeger and Verrall seem to have had our *pleuralis* under the name *ochraceus*.

M. appendiculatus Staeg. (Text-fig. 30, b.)

Syn. *armatus* de Meij.

Closely resembles *ochraceus* except that the antennae seem less extensively yellow at the base (at least in dried specimens).

Hypopygium large; lobe *a* of coxite very small, *b* absent; *c* very long and sharp-pointed, but hardly darkened even at tip; style *e* moderately long, pointed, blackened on distal half; *f* long, stout, sword-shaped, black, tip pointed and bare.

Common.

I have examined the series in Staeger's collection and find that three of the males are this species; a fourth is perhaps *curvatus* Tonn., and a fifth (probably added recently, with the pencil label 'app. Staeg.') is *appendiculatus* in de Meijere's sense. The description of the male hypopygium given by Staeger was as follows (translation from the Danish): 'Tip of the male genitalia recurved, with four shining black equally recurved appendages, the two uppermost short, the two nearest the belly of equal length with the terminal segment.' This description applies much better to the present species than to the one determined by Verrall and de Meijere as *appendiculatus*, and confirms the evidence of the types.

M. medius de Meij. (Text-fig. 30, d.)

Very similar to *appendiculatus*, but femora less evidently darkened towards tips.

Hypopygium: Coxite large, lobe *a* not clearly marked, *b* small and black; *c* not very long; styles *e* and *f* subequal in length but *e* more slender, the sharp black tips turned in opposite directions.

Common.

TASIOCERA Skuse.

Subgenus **DASYMOLOPHILUS** Tonn.

(Text-fig. 23, h.)

Differs from *Molophilus* as follows: Wing-membrane with fairly numerous long hairs, at least in some of the cells (anal and axillary cells bare). Wings narrow at base, the anal angle scarcely indicated. First and second submarginal cells almost equal in length, often with their bases exactly level; *m-cu* distinctly before fork of *M* (in *Molophilus* it is almost always placed beyond the fork). Postnotum with a pair of patches of long hairs, one on each side of the middle at the base. Hypopygium of quite different type, the coxite simple and bearing only a single style. Thorax and abdomen with exceptionally long and dense hair.

Dasymolophilus is now regarded as a subgenus of the tropical genus *Tasiocera*, the tropical species having the hypopygium and postnotal hairs as in *Dasymolophilus* and differing only in the absence of hairs on the wing-membrane and in having the first submarginal cell slightly shorter than the second; the antennae of the males are lengthened in some species, but by no means in all.

T. (D.) murina Mg.

A small, uniformly dark brown or blackish species (almost the smallest British Tipulid) easily distinguished by its extreme hairiness. Halteres blackish. Wing-length 2.5-3.5 mm.

Common. England, Scotland, Ireland.

The specimen in Meigen's collection under the name *murina* is not this species (it may be *M. bihamatus*), but is perhaps not the type as Meigen mentions black halteres. I follow the usual interpretation of the name.

TRICHOCERIDAE.

The winter-gnats (genus *Trichocera*), which together with a few allied genera (of which *Diazosma* is the only one occurring in Europe), constitute the family Trichoceridae, were included by Osten-Sacken in his tribe Limnophilini, to the members of which they bear a close resemblance in venation. The position of these insects in the subfamily Limoniinae was not questioned

until Keilin (1912) showed that the structure of the larvae, particularly as regards the head and mouth parts, is totally unlike that of all other Tipulidae and on the other hand rather closely resembles that of the Anisopodidae (Rhyphidae). In consequence of this discovery some authors proposed to transfer *Trichocera* to the Rhyphidae, but this course led to serious difficulties in formulating any definition of the Rhyphidae on adult characters. It is as impossible to ignore the similarities of the adult *Trichocera* to the Tipulidae as it is to pass over the resemblance of the larvae to the Rhyphidae, consequently it is now agreed that the most satisfactory course is to treat the Trichoceridae as forming a separate family.

The essential distinctions between the families Trichoceridae and Tipulidae in the adult stage are to be found in the structure of the head, the most obvious of these distinctions being the presence of ocelli in this family and their absence in the Tipulidae. Prof. G. C. Crampton has also pointed out to me that the Trichoceridae differ from the Tipulidae and resemble the Anisopodidae in the following respects: The maxillary stipites are long, slender and sub-parallel, the cardines outwardly-directed, and the post-genal areas are widely separated; whereas in the Tipulidae the stipites (when present) are greatly reduced and converge markedly behind, the cardines are absent, and the post-genal angles are approximated or meet and fuse behind the maxillae.

Apart from these distinctions in the structure of the head, there are several other features which, though not fundamental, will separate the Trichoceridae from most if not all other Tipulidae. These are:—

(1) Vein 2A extremely short. (2) Cross-vein *m-cu* at outer end of discal cell. (3) Suture between scutum and scutellum very shallow and ill-defined. (4) Female cerci, when horny, curved downwards instead of upwards, and the style remaining small and inconspicuous. (5) Male styles single and usually simple. (6) Legs not markedly deciduous. (7) Squama with a sparse but continuous fringe of long hairs. (8) Upper surface of posterior pronotum forming with the unusually large paratergite a continuous flat 'shelf' on each side of the mesonotum, the sensory pits longitudinally placed in the furrow between this shelf and the mesonotum (the nearest approach to this formation in the Tipulidae is seen in the genus *Hexatoma*).

DIAZOSMA Bergr.

Syn. *Diazoma* Wallengren (preocc.), *Trichoptera* Strobl (preocc.).

(Pl. I, fig. 13.)

Eyes bare. Ovipositor very short and fleshy. Tibial spurs minute, pale, only one on each tibia. Wing-veins conspicuously

hairy; *2A* moderately short, bent, ending a little beyond anal angle of wing; *r-m* straight and vertical.

Hypopygium: Coxite without well-marked basal ventral lobe.

D. *hirtipenne* Siebke.

Dark brownish; head, scape of antennae and posterior margins of abdominal tergites paler; wings somewhat infuscated but unmarked. Wing-length 5-8 mm.

Herts (Letchworth, Knebworth), Hereford (Cusop Dingle), Inverness (Nethy Bridge), Leicestershire (Goadby), Wilts (Marlborough); a single specimen in each case. vii-viii.

TRICHOcera Mg.

Syn. *Petaurista* (Mg.) Hendel.*

(Pl. I, figs. 14 and 15; text-fig. 31.)

Eyes pubescent. Ovipositor horny, curved down at tip. Tibial spurs small but distinct, two on each of the four posterior tibiae. Wing-veins not conspicuously hairy; *2A* very short, strongly curved, ending a little before anal angle of wing; *r-m* usually oblique and curved. Hypopygium: Each coxite with a large basal ventral lobe which tends to unite with its fellow of the opposite side.

KEY TO BRITISH SPECIES OF TRICHOcera.

1. Abdomen more or less banded 2.
Abdomen unicolorous or at most with tip pale 3.
2. Wings spotted; posterior margins of abdominal segments pale *maculipennis* Mg.
Wings unspotted; anterior margins of abdominal segments pale *annulata* Mg.
3. A more or less distinct cloud over cross-vein *r-m* *regulationis* L.
No trace of cloud over *r-m* 4
4. R_{2+3} shorter than first section of R_2 5.
 R_{2+3} longer than (rarely about equal to) first section of R_2 6.
5. ♀ brownish, with long slender cerci *major* Edw.
♀ blackish, with shorter cerci ? *fuscata* Mg.
6. Cell M_1 more than twice as long as broad and nearly parallel-sided; ♂ style without basal tubercle 7.
Cell M_1 not more than twice as long as broad and somewhat widened apically; ♂ style with small basal tubercle 8.
7. Thorax reddish; antennal scape yellow *rufescens* Edw.
Thorax darker; scape dark *saltator* Harr.
8. Smallish species; wings indistinctly pale at base; basal projections of ♂ coxites forming a complete bridge *hiemalis* De G.
Very small species; wings whitish at base; basal projections of ♂ coxites not meeting in middle *parva* Mg.

*I do not admit the applicability of the name *Petaurista* Mg. 1800 to the genus *Trichocera*. That point will be discussed in another place.

In addition to the eight or ten species noted below, two others are likely to occur in Britain: *lutea* Becher and *forcipula* Nielsen; these both resemble *saltator* but have the ♂ styles highly modified.

T. maculipennis Mg. (Pl. I, fig. 15.)

Distinguished from the other British species by the presence of a dark spot or cloud over base of *Rs*; this spot is sometimes confined to the base of the vein, but more often extends across the upper basal cell; in addition there are more or less distinct clouds over all the cross-veins, and sometimes a trace of a grey spot near outer end of cell *R*₂. The posterior margins of the abdominal segments are pale to a variable extent. Wing-length 7-8 mm.

Hypopygium: Style with small basal tubercle; parameres very long and curved.

A northern species. N. Lancs, Midlothian.

T. annulata Mg.

Distinguished from all the other British species by the presence of yellowish *basal* bands on the abdominal segments, the posterior margins of the segments being broadly dark, but the abdominal banding is more distinct in some specimens than in others. Thorax reddish-tinged, at least on pleurae. Wings with the central cross-veins darkened, sometimes with traces of a dark cloud over *r-m*. Wing-length 5-7.5 mm.

Hypopygium almost as in *maculipennis*.

Common, especially in the south (no Scottish records available). ix-v.

T. regelationis L.

Distinguished by the general dark colour, unbanded abdomen, and presence of a dark cloud over *r-m*; this cloud, however, is sometimes very small and faint; remaining cross-veins sometimes faintly darkened but no darkening at base of *Rs*. Wing-length 5-8 mm.

Hypopygium: Style without basal tubercle; projections of coxites not quite meeting mid-ventrally; parameres very long and recurved.

Abundant in winter; also found in mountains in summer (but in small numbers).

The application of Linnaeus' name to this rather than to one of the other common species is arbitrary.

T. major Edw. (Pl. I, fig. 14; text-fig. 31, a, k.)

The largest British species; usually distinguishable from all the others (except the doubtful *fuscata*) by having *R*₂₊₃ notice-

ably shorter than the first section of R_2 ; this is true of all British specimens I have seen, but is not quite constant, as I have a Latvian specimen in which R_{2+3} is longer than the basal section of R_2 . Body and legs very dark brown in ♂, light brown in ♀. Cerci of ♀ long and slender (longer than in the other species). Wings in ♂ greyish, in ♀ more yellowish; quite unmarked. Cell M_1 long, about four times as long as broad. Wing-length 7.9-5 mm.

Hypopygium: Style very long, without basal tubercle; basal projections of coxites forming a complete bridge; parameres very short.

Beds. (Shefford), Herts (Letchworth, Harpenden), Lanarkshire (Cleghorn), Oxford (Shotover), Yorks (Austwick). x-i.

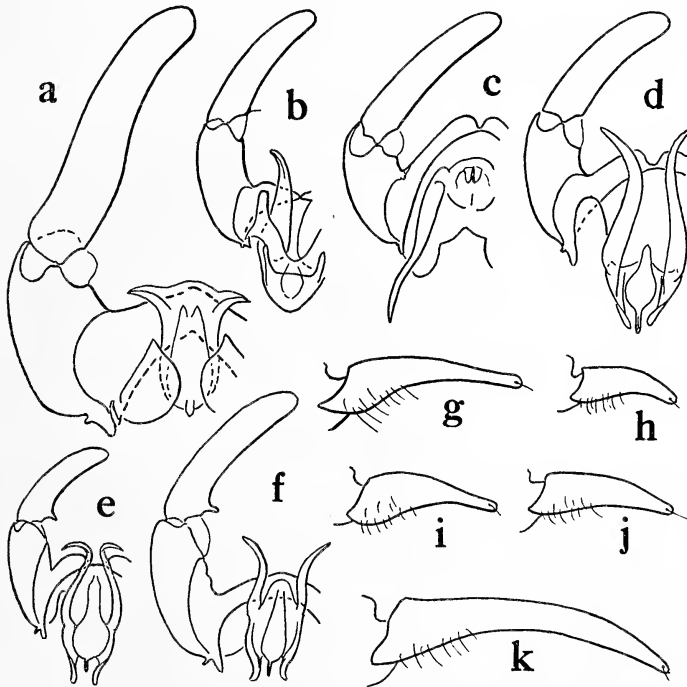


FIG. 31.

a-f, Hypopygia of *Trichocera*, seen from above with tergite removed: a, *major*; b, *rufescens* (type); c, *saltator* (with reflexed parameres); d, *saltator* (with extended parameres); e, *parva*; f, *hiemalis*.

g-k, ovipositors of *Trichocera*, from side: g, *saltator*, usual dark form (Letchworth); h, *saltator* var. *rufulenta* (Letchworth); i, *saltator* or *fusca* (King's Somborne); j, *saltator*, specimen intermediate between dark and reddish forms (Shefford); k, *major*.

T. fuscata Mg.

The identity of this species is not satisfactorily established. I formerly (1921) used the name for the species here called *saltator*, but later found that Meigen's types in Paris have vein R_{2+3} short, and therefore proposed to transfer the name *fuscata* to *major*. Subsequently the matter became complicated by the discovery of female specimens with venation much as in *major* but dark in colour and with much shorter cerci. These may be the true *fuscata* of Meigen and may be either a distinct species or a variation of *saltator*; the specimens examined are from Hants (King's Somborne; text-fig. 28, i) and Kent (Dover; specimen agreeing closely with the one figured).

T. saltator Harris. (Text-fig. 31, c, d, g.)

Syn. *fuscata* Edw., de Meij., 1921 (nec Meigen?).

Blackish-brown; abdomen unbanded; wings somewhat smoky but unmarked. R_{2+3} usually longer than first section of R_2 , sometimes only slightly so, or of about the same length. Cell M_1 rather long and parallel-sided, but not quite so long as in *major* (about three times as long as broad). Thorax dark except for the posterior pronotum; scutum often with traces of a median pair of brown stripes. Cerci of ♀ moderately long, narrowed apically. Wing-length 6-8 mm.

Hypopygium: Style simple, without basal tubercle; basal process of coxites just meeting mid-ventrally but not completely fused; parameres long and recurved.

Abundant in winter.

There seems to be some variation in the thickness and relative lengths of the first few segments of the antennal flagellum. Possibly there may be more than one species here.

var.? **rufulenta** n. (Text-fig. 31, h.)

Differs from *saltator* as determined above in having the pleurae, sides of mesonotum and the scutellum reddish-tinged. Cerci of ♀ much shorter. R_{2+3} on the average longer, venation otherwise similar.

Hypopygium as in *saltator*; parameres perhaps even longer, but no obvious distinctions observable even between specimens of the two forms taken *in cop.* with their respective females

Herts and Beds.; probably common and widespread.

I referred to this in 1921 as 'the somewhat reddish variety of *T. fuscata*,' but in view of the definite difference in the ♀ cerci it may well be a distinct species.

T. rufescens Edw. (Text-fig. 31, b.)

Another species which is still insufficiently known and of somewhat doubtful validity. Differs from the other plain-winged species in having the scape of antennae yellowish and thorax largely light reddish, only the praescutum more or less darkened in middle. Cerci of ♀ moderately long. Venation as in *saltator*. Wing-length 5-6 mm.

Hypopygium almost as in *saltator*, but parameres definitely shorter.

Cornwall (Lelant), Lanarkshire (Gorge of Avon), Morayshire (Elgin), Notts (West Leake), Yorks (Mulgrave Woods).

T. hiemalis De G. (Text-fig. 31, f.)

A small blackish species. Wings quite unmarked, usually less tinted with grey than in *saltator*, and only rather indistinctly pale at base. R_{2+3} longer than first section of R_2 ; cell M_1 less than twice as long as broad (sometimes hardly longer than broad), widened apically. Cerci of ♀ moderately long. Wing-length 5-6.5 mm.

Hypopygium: Style with a distinct tubercle on inner side close to base; basal projections of coxites forming a complete bridge which is almost straight and not narrowed in middle; parameres long, slender and recurved.

Abundant in winter.

T. parva Mg. (Text-fig. 31, e.)

The smallest species of the genus; very similar to *hiemalis*, but wings perhaps clearer, with the base rather conspicuously whitish.

Hypopygium: Style with a small tubercle on inner side, but this rather less pronounced than in *hiemalis*; basal projections of coxites not meeting in middle; parameres longer than in *hiemalis*. Wing-length 4.5-5.5 mm.

Probably common, but records only from Beds. (Shefford), Dumbarton (Kilpatrick Hills) and Herts (Letchworth, Harpenden).

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CHECK-LIST OF BRITISH SPECIES.

TIPULIDAE.

CYLINDROTOMINAE.

Cylindrotoma Meq.
1. distinctissima Mg.

Triogma Schin.
3. trisulcata Schin.

Phalacrocera Schin.
4. replicata L.

Diogma Edw.
2. glabrata Mg.

LIMONIINAE.

LIMONIINI.

Limonia Mg. sens.lat.
Metalimnobia Mats.
1. bifasciata Schr.
2. quadrimaculata L.
3. quadrinotata Mg.

19. ornata Mg.
20. lucida de Meig.
21. goritiensis Mik.
21a. var. cornubiensis Edw.

Geranomyia Hal.
43. unicolor Hal.
44. bezzii Alex.

Discobola O.-S.
4. annulata L.

22. didyma Mg.
23. consimilis Zett.
24. chorea Mg.
25. mitis Mg.

Rhipidia Mg.
45. maculata Mg.
46. ctenophora Lw.
47. uniseriata Schin.

Limonia Mg. s.str.
5. nubeculosa Mg.
6. flavipes F.
7. dilutior Edw.
8. maculipennis Mg.
9. nigropunctata Schum.
10. masoni Edw.
11. tripunctata F.
12. trivittata Schum.
13. stigma Mg.
14. macrostigma Schum.

25a. var. affinis Schum.
25b. var. lutea Mg.
26. modesta Mg.
27. patens Lundst.
28. ventralis Schum.
29. sera Walk.

Taphrophila Rond.
48. vitripennis Mg.

Dicranomyia Steph.
15. decem-maculata Lw.
16. fusca Mg.
17. aquosa Verr.
18. dumetorum Mg.

30. autumnalis Staeg.
31. sericata Mg.
32. distendens Lundst.
33. stigmatica Mg.
34. complicata de Meij.
35. danica Kuntze.
36. halterella Edw.
37. aperta Wahlgr.
38. rufiventris Strobl.
39. morio F.
40. caledonica Edw.
41. stylifera Lack.
42. occidua Edw.

Thaumastoptera Mik.
49. calceata Mik.

Orimarga O.-S.
50. virgo Zett.
51. attenuata Walk.

Elliptera Egg.
52. omissa Ed.

Helius St. Farg.
53. longirostris Mg.
54. flavus Walk.
55. pallirostris Edw.

PEDICINI.

Pedicia Latr.
Pedicia Latr. s.str.
1. rivosa L.

Tricyphona Zett.
5. lucidipennis Edw.
6. claripennis Verr.
7. immaculata Mg.
8. unicolor Schum.
9. schummeli Edw.

Paradicranota Alex.
12. pavidata Hal.
13. subtilis Lw.
14. brevitarsis Bergr.

Crunobia Kol.
2. littoralis Mg.
3. straminea Mg.

Rhaphidolabis O.-S.
15. exclusa Walk.

Amalopsis Hal.
4. occulta Mg.

Dicranota Zett.
Dicranota Zett. s.str.
10. bimaculata Schum.
11. guerini Zett.

Ula Hal.
16. sylvatica Mg.

HEXATOMINI.

- Hexatoma** Latr.
 1. bicolor Mg.
 2. fuscipennis Curt.
- Dactylolabis** O.-S.
 3. sexmaculata Mcq.
 4. transversa Mg.
- Epiphragma** O.-S.
 5. ocellaris L.
- Austrolimnophila** Alex.
 6. ochracea Mg.
- Limnophila** Mcq.
Phylidorea Big.
 7. meigeni Verr.
 8. phaeostigma Schum.
 9. dispar Mg.
 10. lineola Mg.
 11. fulvonervosa Schum.
 12. aperta Verr.
 13. ferruginea Mg.
 14. heterogama Bergr.
15. glabricula Mg.
 16. squalens Zett.
 17. abdominalis Staeg.
- Idioptera* Mcq.
 18. fasciata L.
 19. pulchella Mg.
- Elaeophila* Rond.
 20. trimaculata Zett.
 21. verralli Bergr.
 22. apicata Lw.
 23. mundata Lw.
 24. maculata Mg.
 24a. v. decora Hall.
 24b. v. aegle Edw.
 25. submarmorata Verr.
 25a. v. oligosticta Edw.
 25b. v. bistriata Edw.
 25c. v. eatoni Edw.
 25d. v. suffumata Edw.
 25e. v. pentasticta Edw.
- Limnophila* Mcq. s.str.
 26. punctata Schrank.
 27. pictipennis Mg.
- Pseudolimnophila* Alex.
 28. lucorum Mg.
 29. sepium Verr.
- Pilaria* Sintenis.
 30. discicollis Mg.
 31. fuscipennis Mg.
 32. scutellata Staeg.
 33. meridiana Staeg.
34. nemoralis Mg.
 34a. v. minuscula Edw.
 34b. v. separata Walk.
 34c. v. quadrata Edw.
 35. adjuncta Walk.
36. filata Walk.
 37. batava Edw.
- Oxydiscus** de Meij.
 38. senilis Hal.
 39. fuscus Lw.
 40. ecalcaratus Edw.
 41. nielsenj Kuntze.

ERIOPTERINI.

- Neolimnophila** Alex.
 1. carteri Tonn.
 2. placida Mg.
- Crypteria** Bergr.
 3. limnophiloides Bergr.
- Lipsothrix** Lw.
 4. remota Walk.
 5. ecucullata Edw.
 6. errans Walk.
 7. nigrostigma Edw.
 8. nervosa Edw.
- Gnophomyia** O.-S.
 9. lugubris Zett.
- Gonomyia** Mg.
Ellipteroides Beck.
 10. lateralis Mcq.
 11. alboscutellata v. Ros.
Idiocera Dale.
 12. sexguttata Dale.
 13. punctata Edw.
 14. connexa Lw.
- Gonomyia* s.str.
 15. bifida Tonn.
 16. tenella Mg.
 17. dentata de Meij.
 18. conoviensis Barnes.
 19. simplex Tonn.
 20. lucidula de Meij.
 21. recta Tonn.
- Lipophleps* Bergr.
 22. abbreviata Lw.
- Rhabdomastix** Skuse.
 23. hilaris Edw.
 24. parva Siebke.
 25. inclinata Edw.
- Cheilotrichia** Rossi.
Gonempeda Alex.
 26. flava Schum.
- Cheilotrichia* Rossi, s.str.
 27. imbuta Mg.
- Empeda* O.-S.
 28. cinerascens Mg.
- Erioptera** Mg.
Erioptera Mg. s.str.
 29. flavescens L.
 30. mejerei Edw.
 31. nielseni de Meij.
 32. squalida Lw.
 33. divisa Walk.
 34. limbata Lw.
 35. griseipennis Mg.
 36. nigripalpis Goet.
 37. lutea Mg. (v. taenionota Mg.).
 38. fusculentata Edw.
 39. fuscipennis Mg.
 40. riedeli Lack.
 41. trivialis Mg.
 42. diuturna Walk.
- Symplecta* Mg.
 43. hybrida Mg.
 43 bis. scotica Edw.
 44. stictica Mg.
- Trimicra* O.-S.
 45. pilipes F.

- Psiloconopa* Zett.
46. meigeni Zett.
47. melampodia Lw.
48. pusilla Schin.

- Ilisia* Rond.
49. maculata Mg.
50. occoecata Edw.
51. areolata Siebke.
52. vicina Tonn.

Ormosia Rond.

- Ormosia* Rond. s.str.
53. lineata Mcq.
54. nodulosa Mcq.
55. depilata Edw.
56. hederæ Curt.
57. aciculata Edw.
58. albitibia Edw.
59. bicornis de Meij.

60. similis Staeg.
61. pseudosimilis
Lundst.

- Scleroprocta* Edw.
62. sororcula Zett.
63. danica Nielsen.

- Rhypholophus* Kol.
64. varia Mg.
65. bifurcata Goet.
66. haemorrhoidalis
Zett.

Molophilus Curt.

67. ater Mg.
68. niger Goet.
69. czizeki Lack.
70. bihamatus de Meij.
71. obscurus Mg.
72. pleuralis de Meij.

73. occultus de Meij.
74. curvatus Tonn.
75. propinquus Egg.
76. undulatus Tonn.
77. bifidus Tonn.
78. griseus Mg.
79. pusillus Edw.
80. serpentiger Edw.
81. corniger de Meij.
82. cinereifrons de Meij.
83. ochrescens Edw.
84. flavus Goet.
85. ochraceus Mg.
86. appendiculatus
Staeg.
87. medius de Meij.

Tasiocera Skuse.

- Dasymolophilus* Tonn.
88. murina Mg.

TRICHOCERIDAE.

- Diazosma** Bergr.
1. hirtipenne Siebke.

- Trichocera** Mg.
2. maculipennis Mg.

3. annulata Mg.
4. regelationis L.
5. major Edw.
5a. ? fuscata Mg.
6. saltator Harr.

- 6a. var. rufulenta
Edw.
7. rufescens Edw.
8. hiemalis De G.
9. parva Mg.

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EXPLANATION OF PLATES.

Wings of British Crane-flies, mostly magnified about 4-5 diameters
(the larger wings less ; those on Plate V rather more).

PLATE I.

PEDICINI.

- Fig. 1. *Pedicia (Pedicia) vivosa* L. (Southern type).
2. " " " " var. (Northern type).
3. " " (*Amalopis*) *occulta* Mg.
4. " " (*Crunobia*) *littoralis* Mg.
5. " " " *straminea* Mg.
6. " " (*Tricyphona*) *lucidipennis* Edw.
7. *Dicranota (Paradicranota) pavidata* Hal.
8. " " (*Dicranota*) *bimaculata* Schum.
9. *Ula sylvatica* Mg.

CYLINDROTOMINAE.

- Fig. 10. *Diogma glabrata* Mg.
11. *Cylindrotoma distinctissima* Mg. The cross-vein in cell R
is abnormal.
12. *Phalacrocerca replicata* L.

TRICHOCERIDAE.

- Fig. 13. *Diazosma hirtipenne* Siebke.
14. *Trichocera major* Edw.
15. " " *maculipennis* Mg.

LIMONINI.

- Fig. 16. *Orimarga attenuata* Walk.
17. *Thaumastopectera calceata* Mik.
18. *Taphrophila vitripennis* Mg.
19. *Ellipectera omissa* Egg.
20. *Helius pallirostris* Edw.

PLATE I.

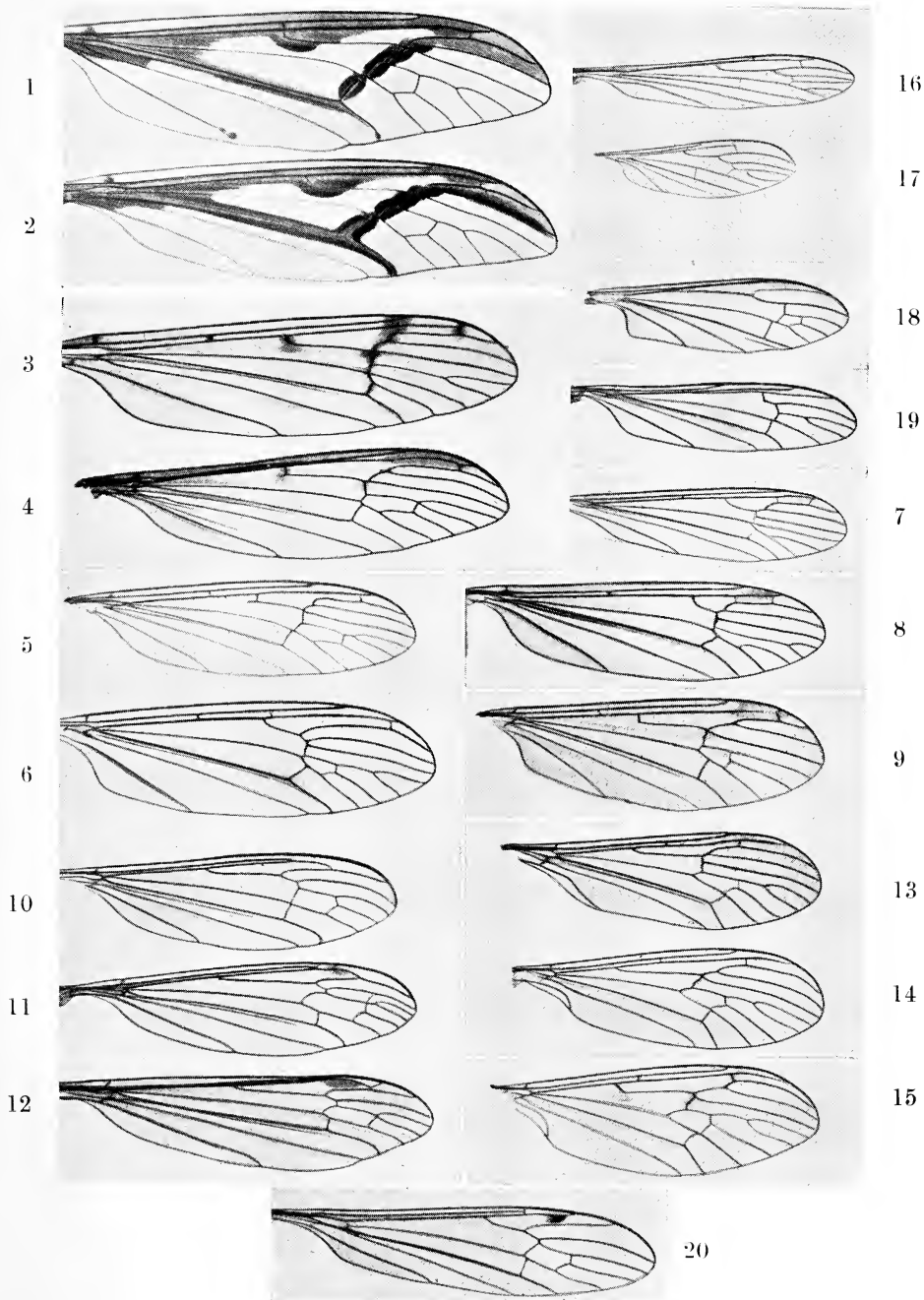


PLATE II.

LIMONIINI.

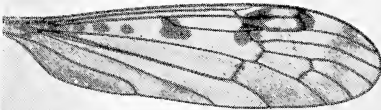
- | | | | | |
|---------|----------------|-------------------------|-----------------------|--|
| Fig. 1. | <i>Limonia</i> | (<i>Metalimnobia</i>) | <i>quadrimaculata</i> | L. |
| 2. | " | " | <i>quadrinotata</i> | Mg. |
| 3. | " | " | <i>bifasciata</i> | Schrank. |
| 4. | " | " | " | var. |
| 5. | " | (<i>Limonia</i>) | <i>flavipes</i> | F. |
| 6. | " | " | <i>nubeculosa</i> | Mg. |
| 7. | " | " | " | aberration |
| 7. | " | " | " | aberration (Kings Weston, Glos). |
| 8. | " | " | <i>dilutior</i> | Edw. |
| 9. | " | " | <i>maculipennis</i> | Mg. |
| 10. | " | " | <i>nigropunctata</i> | Schum. |
| 11. | " | " | <i>tripunctata</i> | F. |
| 12. | " | (<i>Dicranomyia</i>) | <i>decemmaculata</i> | Lw. |
| 13. | " | " | <i>ornata</i> | Mg. |
| 14. | " | " | <i>lucida</i> | de Meij. |
| 15. | " | " | <i>dumetorum</i> | Mg. |
| 16. | " | " | <i>goritiensis</i> | Mik. |
| 17. | " | " | " | var. <i>cornubiensis</i> n. (Lelant, Cornwall). |
| 18. | " | " | <i>didyma</i> | Mg. Dark specimen. |
| 19. | " | " | <i>mitis</i> | Mg. var. <i>affinis</i> Schum. |
| 20. | " | " | <i>chorea</i> | Mg. |

PLATE II.

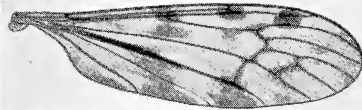
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8



12



9



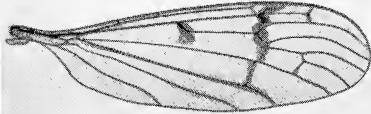
10



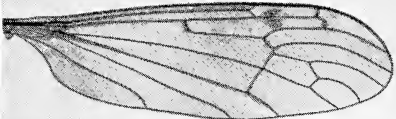
11



3



4



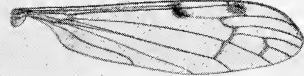
13



14



15



16



17



18



19



20



PLATE III.

LIMONIINI.

- Fig. 1. *Limonia* (*Discobola*) *annulata* L.
 2. " (*Geranomyia*) *unicolor* Hal.
 3. " (*Rhipidia*) *maculata* Mg. A rather pale specimen.
 4. " " *ctenophora* Lw.

HEXATOMINI.

- Fig. 5. *Epiphragma ocellaris* L. A rather dark specimen.
 6. " " " Pale specimen.
 7. *Dactylolabis sexmaculata* Mcq.
 8. " *transversa* Mg.
 9. *Limnophila pictipennis* Mg.
 10. " " var. *angustipennis* Mg.
 11. " (*Pilaria*) *discicollis* Mg. With abnormal veinlet in cell M_1 .
 12. " (*Phylidorea*) *phaeostigma* Schum.
 13. *Austrolimnophila ochracea* Mg.
 14. *Hexatoma fuscipennis* Curt.
 15. *Limnophila* (*Pseudolimnophila*) *lucorum* Mg.
 16. " (*Pilaria*?) *adjuncta* Walk.
 17. " " *nemoralis* Mg.
 18. " (*Phylidorea*) *squalens* Zett.
 19. " (*Pilaria*?) *filata* Walk. (The oval, closed cell M_1 is abnormal.)
 20. " (*Phylidorea*) *aperta* Verr.
 21. " (*Pilaria*) *meridiana* Staeg.
 22. *Oxydiscus senilis* Hal.

PLATE III.

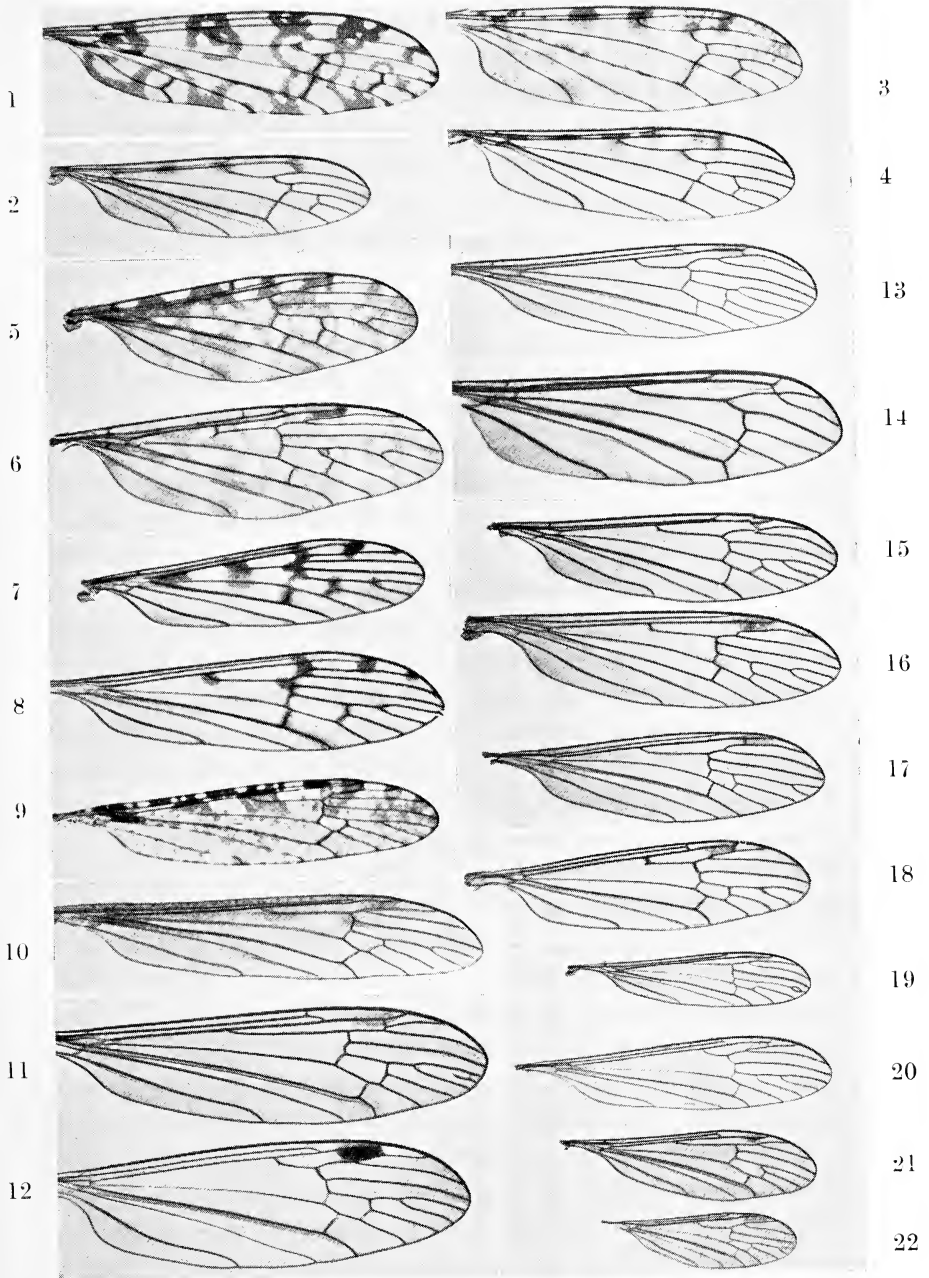




PLATE IV.

HEXATOMINI.

| | | | | |
|---------|---|-----------------------|--------------------------|-------------------------------|
| Fig. 1. | <i>Limnophila (Elacophila) submarmorata</i> | Verr. | ♂. | Average wing |
| 2. | " | " | " | ♂. Light wing. |
| 3. | " | " | " | v. <i>bistriata</i> n. |
| 4. | " | " | " | v. <i>oligosticta</i> n. |
| 5. | " | " | " | v. <i>suffumata</i> n. |
| 6. | " | " | " | v. <i>pentasticta</i> n. |
| 7. | " | " | " | v. <i>catoni</i> n. |
| 8. | " | " | <i>verralli</i> Bergr. | |
| 9. | " | " | <i>apicata</i> Lw. | |
| 10. | " | " | <i>mundata</i> Lw. | |
| 11. | " | " | <i>maculata</i> Mg. | ♂. Average wing. |
| 12. | " | " | " | ♂. Dark wing. |
| 13. | " | " | " | v. <i>decora</i> Hal. Type ♂. |
| 14. | " | " | " | v. <i>aegle</i> n. Type ♀. |
| 15. | " | (<i>Idioptera</i>) | <i>pulchella</i> Mg. | ♂. |
| 16. | " | " | <i>fasciata</i> L. | ♂. |
| 17. | " | (<i>Elacophila</i>) | <i>trimaculata</i> Zett. | |
| 18. | " | (<i>Limnophila</i>) | <i>punctata</i> Schrank. | Light wing. |
| 19. | " | " | " | Average wing. |
| 20. | " | " | " | Dark wing. |

PLATE IV.

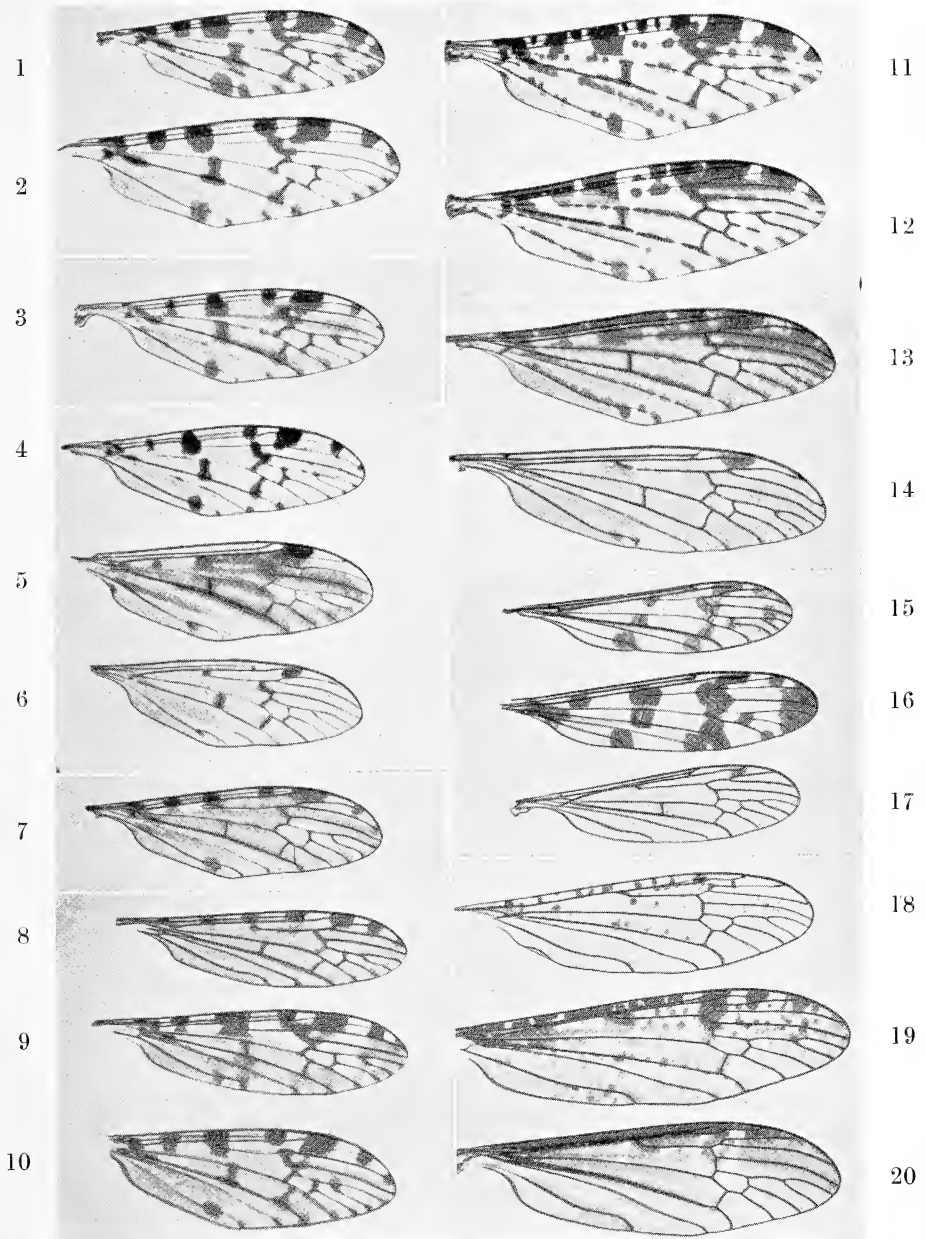
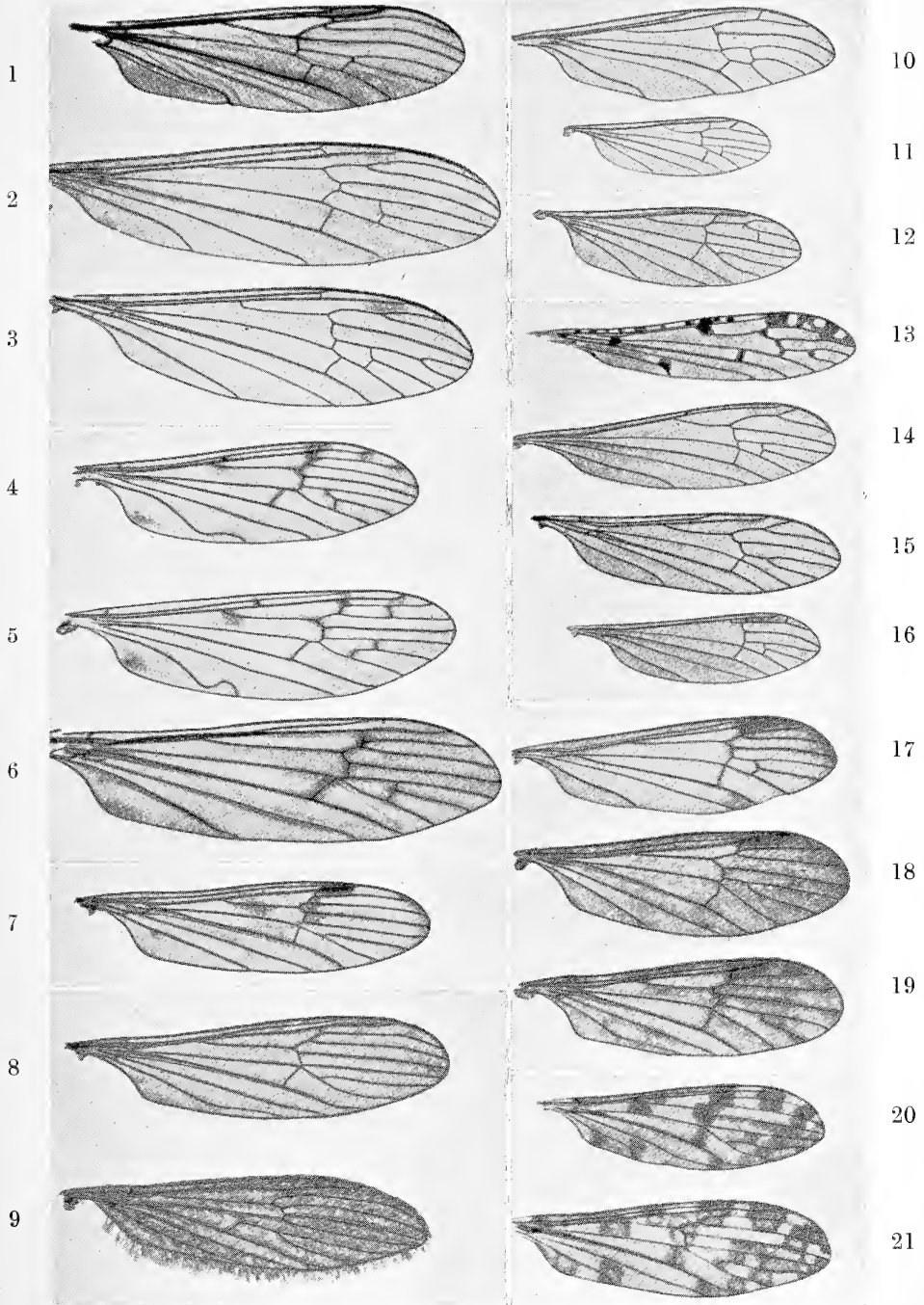


PLATE V.

ERIOPTERINI.

- Fig. 1. *Gnophon yia lugubris* Zett.
 2. *Lipsolthrix remota* Walk.
 3. *Neolimnophila carteri* Tonn.
 4. *Erioptera (Symplecta) stictica* Mg.
 5. " " *hybrida* Mg.
 6. " (*Trimicra*) *pilipes* F.
 7. " (*Psiloconopa*) *melampodia* Lw.
 8. " (*Erioptera*) *fuscipennis* Mg. ♀.
 9. *Molophilus griseus* Mg.
 10. *Rhabdomastix hilaris* sp.n.
 11. *Cheilotrichia (Gonempeda) flava* Schum.
 12. " (*Empeda*) *cinerascens* Mg. The cross-vein in cell
 *R*₃ is abnormal.
 13. *Gonomyia (Idiocera) sexguttata* Dale.
 14. " (*Gonomyia*) *dentata* de Meij.
 15. " (*Ellipteroides*) *lateralis* Mcq.
 16. " (*Lipophleps*) *abbreviata* Lw.
 17. *Ormosia (Scleroprocta) danica* Nielsen.
 18. " (*Ormosia*) *albitibia* Edw.
 19. " (*Rhypholophus*) *varius* Mg.
 20. *Erioptera (Ilisia) occoecata* Edw.
 21. " " *maculata* Mg.

PLATE V.





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